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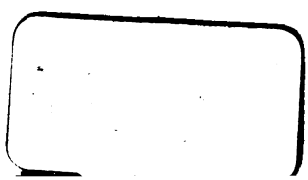
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A
MANUAL OF MEDICAL TREATMENT
OR
CLINICAL THERAPEUTICS

WORKS BY DR. BURNEY YEO.

A Manual of Medical Treatment, or Clinical Therapeutics. (*Revised Edition.*) *Two Vols.*

Food in Health and Disease. (*Enlarged Edition.*)

The Therapeutics of Mineral Springs and Climates.

John H. Blodgett, M. D.
[redacted] Commonwealth Avenue.

A MANUAL

OF

MEDICAL TREATMENT

OR

CLINICAL THERAPEUTICS

BY

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EMERITUS PROFESSOR OF MEDICINE IN KING'S COLLEGE, LONDON; CONSULTING PHYSICIAN TO KING'S COLLEGE HOSPITAL; HON. FELLOW OF KING'S COLLEGE; FORMERLY PROFESSOR OF THE PRINCIPLES AND PRACTICE OF MEDICINE AND OF CLINICAL THERAPEUTICS IN KING'S COLLEGE, AND EXAMINER IN MEDICINE AT THE ROYAL COLLEGE OF PHYSICIANS. AUTHOR OF "FOOD IN HEALTH AND DISEASE," ETC. ETC.

Revised Edition,
with Formulæ adapted to the Standard of Strength of Preparations employed in America,
by OSCAR OLDBERG, *Phar.D., Dean of the School of Pharmacy of North-Western University, Member of the Committee of Revision of the Pharmacopœia of the United States*

FOURTEENTH EDITION
TWENTY-SECOND THOUSAND

Vol. I.

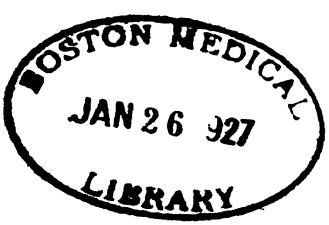
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JOHN H. BLODGETT, M. D.
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To

HIS FRIENDS AND PUPILS

AMONGST THE PAST AND PRESENT STUDENTS

OF

KING'S COLLEGE HOSPITAL

THIS WORK

IS DEDICATED BY THE AUTHOR.

PREFACE TO THE NEW AND REVISED EDITION.

SINCE the publication of the first edition of this work in 1893, it has been the author's privilege to receive from all parts of the Empire the most flattering acknowledgments of its value and usefulness, and it now becomes his first duty to return his warmest thanks to the medical profession for their gratifying estimate of his labours. The preparation of a *new* and *revised* edition, which he might hope would be, in some respects, worthy of the very favourable reception accorded to its predecessor, has been no light task.

The vast amount of material—not all, certainly, of equal value—which is being so rapidly produced in connection with the subject of Therapeutics has necessitated a most careful examination and sifting in order to retain what is likely to be of lasting service, and to discard that which, at best, can only

be destined to a temporary popularity. In carrying out this attempt, to the best of his judgment, the author trusts he has not overlooked anything of real value. In accordance with the suggestions of friendly critics, certain additional subjects have received consideration in this edition, such as the treatment of Hay Fever, of Paralysis Agitans, of Cerebral Tumours, of Erysipelas, of Cerebro-spinal Fever, and of Rickets, Scurvy, and Purpura.

Hertford Street, Mayfair,
September, 1902.

EXTRACT FROM PREFACE TO THE FIRST EDITION.

THE object of this work is the study of disease from the point of view of treatment. The teaching of Therapeutics is here approached from the side of the disease, and not from the side of the drug or remedy —a method which has been thought more natural and more interesting than the one usually adopted. It has not, however, been attempted to discuss questions of treatment apart from considerations of the clinical history, course, and pathological characters of each disease.

It is clear that any, or every, part of the natural history of a disease may bear, directly or indirectly, on its treatment, but some parts far more than others; and it would be most unphilosophical and unedifying to discuss the therapeutics of a disease without, at the same time, considering the true nature of the phenomena we are endeavouring to control.

It is by examining into the mode of *causation* of disease, by investigating the true nature of the morbid changes which underlie the *phenomena* of disease, and by an exact knowledge of the properties and mode of action of the agencies we introduce for the purpose of influencing favourably its course, that what are termed *rational indications* for treatment are arrived at.

It has been the Author's aim, therefore, in the following pages, wherever it was possible, to deduce rational indications for treatment from an examination of the pathological nature and the clinical course and characters of the disease under discussion.

Selections of formulæ, published for the most part by well-known physicians, are added to most of the chapters, for the purpose of giving completeness and breadth of view to the subject. Those in the first chapters are printed without any abbreviation, solely for educational reasons.

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TABLE SHOWING DIFFERENCES IN STRENGTH BETWEEN BRITISH AND AMERICAN MEDICINAL PREPARATIONS (B.P. OF 1898 AND U.S.P. OF 1905).

Preparation.	Strength.	
	British.	American.
Acetum Scillæ	12.5 %	10 %
Acid. Acet. Dil.	4.27 %	6 %
„ Phosph. Dil. ...	13.8 %	10 %
„ Sulph. Arom. ...	13.8 %	20 %
„ Sulph. Dil. ...	13.65 %	10 %
„ Sulphurosum Dil.	5 % SO_2	6 % SO_2
Æther	74 %	96 %
Extr. Belladonnæ ...	1 % alk.	1.4 % alk.
„ Hyoscyami ...	0.15 % alk.	0.3 % alk.
„ Physostigmatis ...	1.20 % alk.	2 % alk.
„ Bellad. Pod Fl.	0.75 % alk.	0.5 % alk.
„ Cinch. Pl.	5 % alk.	4 % alk.
„ Ipecac. Fl. ...	2 to 2.25 % alk.	1.75 alk.
„ Nuc. Vom. Fl. ...	1.5 % strych.	1 strych.
Inf. Digitalis	0.68 % drug	1.5 % drug
Opii Pulvis	10 % morphine	12.5 % morphine
Tinct. Aconiti	5 drug	10 drug
Tinct. Aloes...	2.5 drug	10 drug
„ Arnicæ Flor. ...	—	20 drug
„ „ Pod. ...	5 % drug	—
„ Belladonnæ ...	0.05 alk.	0.035 alk.
„ Cannabis Ind. ...	25 % drug.	10 drug
„ Cantharidis ...	1.25 %	10 %
„ Capsici	5 %	10 %
„ Catechu	20 %	5 %
„ Cimicifugæ ...	10 %	20 %
„ Cinch.	1 % alk.	0.75 % alk.
„ Colchici Sem. ...	20 %	10 %
„ Digitalis	12.5 %	10 %
„ Ferri Chloridi ...	5.6 % Fe	4.6 % Fe.
„ Hydrastis	10 %	20 %
„ Iodi	2.5 %	8 %
„ Kino	10 %	5 %
„ Lactucarii	Unoff. 10 %	5 %
„ Nucis Vom. ...	0.25 % strych.	0.10 % strych.
„ Opii	0.75 % morphine	1.25 % morphine
„ Rhei	Unoff. 10 %	20 %
„ Scillæ...	20 %	10 %
„ Stramonii	10 % leaves	0.03 % alk.
„ Strophanthi ...	2.5 % drug	10 % drug
„ Veratri	Unoff. 20 %	10 %
„ Zingiberis... ...	10 %	20 %
Vin. Colchici Sem. ...	—	10 %
„ „ Pod. ...	20 %	—
„ Ferri	1 in 60	1 in 25
„ Ipecac.	5 %	10 %
„ Opii	0.75 % morphine	1.25 % morphine

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MANUAL OF MEDICAL TREATMENT.

Part I.

DISEASES OF THE ORGANS OF DIGESTION.

CHAPTER I.

TREATMENT OF DISEASES OF THE MOUTH, TONSILS, AND PHARYNX.

STOMATITIS.—Inflammation of the Mouth—Varieties: (1) Simple Catarrhal Stomatitis—Symptoms—Causes—Indications for Treatment. (2) Vesicular or Aphthous Stomatitis—Characters and Symptoms—Causation—Treatment. (3) Parasitic Stomatitis, Aphthæ or Thrush—Symptoms—Causes—Indications for Treatment—Prophylaxis. (4) Ulcerative or Pseudo-Membranous Stomatitis—Symptoms and Characters—Causation—Indications for Treatment. (5) Gangrenous Stomatitis, Cancrum Oris, Noma—Causation—Characters and Symptoms—Treatment. (6) Mercurial Stomatitis—Symptoms—Treatment. TONSILLITIS.—Varieties—Causes—Symptoms—Suppurative Form—Treatment—Prophylaxis—Chronic Hypertrophy of Tonsils—Follicular Tonsillitis. ACUTE PHARYNGEAL CATARRH.—Angina, or Sore Throat—Characters—Causes—Symptoms—Treatment. CHRONIC PHARYNGEAL CATARRH.—Varieties: (*a*) Simple. (*b*) Follicular, or Granular—Causation—Symptoms—Treatment—Mineral Waters. Additional Formulæ.

DISEASES OF THE MOUTH.

THERE are several forms of *inflammation of the mouth*, the treatment of which we have to consider; and although the indications for treatment are in most of them similar, yet for the sake of clearness it will be desirable to treat of each form separately and in the following order:—

1. **Simple catarrhal stomatitis,** or **catarrh of the mouth.**—The principal symptoms of this affection are redness, tenderness, and swelling of the mucous membrane of the cheeks, gums, and tongue. The tongue is also covered with a thick fur, and shows the indentations of the teeth. The secretions of the mouth are increased, and its cavity is covered with thick yellow mucus. The sense of taste is blunted and perverted so that the patient complains especially of a "bad" taste, or a slimy, clammy, sometimes bitter taste, and a "foul" smell. In the form which accompanies dentition in infancy there is often much constitutional distress, and convulsions are sometimes induced.

The usual **causes** of this condition are dentition in infancy, cutting the wisdom teeth in adults, the presence of carious or of badly arranged artificial teeth, the abuse of tobacco, of too highly-seasoned food and too hot beverages, and insufficient cleansing of the teeth and mouth.

It is frequently associated with the *febrile* state, and often accompanies gastric catarrh and habitual constipation. It may also be propagated from adjacent inflamed organs, as in facial erysipelas and inflammation of the throat. It is occasionally referrible to obscure nervous states.

The **indications for treatment** are, *first*, the removal, when possible, of any of the causes enumerated above that may be found to exist; the sharp irritating edges of carious teeth must be removed, the smoking of strong cigars forbidden, and errors in food and drink corrected. Constipation must be relieved, and a saline aperient is almost always desirable. Coexistent gastric catarrh may require the administration of bismuth and alkalies. *Secondly*, emollient cleansing and antiseptic washes are needed to remove the foul secretions, and to keep the oral cavity clean, and to soothe the irritation. At first lotions of tepid gum-water or barley water, with 5 or 6 grains of bicarbonate of soda to the ounce, should be used. The carbonates

of the alkalies exert a solvent action on mucus, and so serve to detach and wash away the foul sticky mucous secretions covering the inflamed mucous membrane. Lime water, borax washes, and borax tabloids are useful. A wash containing salicylic acid 1 part, dissolved in 5 parts of alcohol, and added to 250 parts of water, has the advantage of acting both as an antiseptic and an anæsthetic, or boric acid solution may be used. Preparations of eucalyptus or hydrastis may be added to borax washes. As an astringent lotion a solution of alum (5 grains to the ounce) is sometimes useful.

In troublesome cases the mucous membrane may be brushed with a solution of corrosive sublimate (1 in 5,000) or of nitrate of silver (2 grains to the ounce). If there is diarrhœa astringents and opiates may be needed. Sucking fragments of ice will often relieve the heat and sensitiveness of the mouth. The following is a good formula for a mouth wash :—

℞ Boracis		drachmas duas (ʒij).
Sodii bicarbonatis		grana quadraginta (gr. xl).
Tincturæ eucalypti foliorum		unciam (ʒj).
Glycerini		semi unciam (ʒss).
Aquæ		ad uncias octo (ʒviij).

Misce, fiat lotio. To be used freely mixed with an equal quantity of warm water.

2. **Vesicular stomatitis,** also termed **aphthous stomatitis,** and **herpes of mouth,** and **aphthæ**.—In this affection small white spots (often termed aphthæ) appear on the mucous membrane of the mouth, the spots are surrounded by a red border, and are said to be at first *vesicular*, but this is doubtful. The white spots are probably an exudation from the free surface of the mucous membrane beneath the epithelium ; these spots are thrown off, and raw excoriated surfaces left. They occur on the anterior half of the tongue, on the inner surface of the lips and cheeks, and on the hard palate ; they are round, about the size of lentils, often numerous and apt to run together into confluent irregular patches. There

is usually abundant mucous catarrh of the mouth, and increased salivation. The breath is foul from decaying epithelium, and the mouth is hot and painful. There are also feverishness and loss of appetite.

With regard to its **causation**, it is more frequent in children than in adults, and it is prone to occur in feeble, ill-nourished, scrofulous children during the period of detention. It is also observed to accompany certain exanthemata, and particularly measles, as well as other cutaneous affections. It seems at times to be epidemic, especially amongst parturient women (*stomatitis materna*), and to spread by contagion. It is often found to occur in institutions where children are crowded together, with insanitary surroundings, and unsuitable or insufficient food. It frequently accompanies exhausting and debilitating diseases. Excessive humidity and inundations are said to favour its appearance.

The **treatment** should be begun with a mild antacid laxative, such as rhubarb and magnesia. If, however, there is diarrhœa, a powder consisting of 2 to 4 grains of subnitrate of bismuth and 1 to 3 grains of compound kino powder (according to the age of the child), and 2 to 4 grains of sodium bicarbonate may be given three times a day. Potassium chlorate used to be regarded as a valuable remedy, but it has recently been denounced by some American writers as causing great pain and doing no good.*

The **local treatment** must consist at first in the use of demulcent alkaline and antiseptic washes.

A variety of *antiseptic* washes have been suggested, *e.g.* a solution of sulphite or hyposulphite of sodium, 30 grains to the ounce, creasote water, boric acid in saturated solution, borax washes, chlorine water, chlorinated soda solution, carbolic acid lotion (3 to 5 per cent.)—this has the advantage of being anæsthetic—the application by means of a camel-hair brush of dry alum, borax, or bismuth. If the spots are slow to

* Hare's "System of Practical Therapeutics" (new edition), vol. ii. p. 238.

heal they may be touched with solid nitrate of silver, or with a strong solution of the same (60 grains to the ounce), or with a solution of cupric sulphate (10 grains to the ounce), or zinc sulphate (20 grains to the ounce), or mercuric chloride (1 grain to the ounce), or iodoform may be applied.

Or the spots may be touched with *lapis divinus*, which is made by fusing together equal parts of cupric sulphate, alum, and potassic nitrate. In cachectic cases tonics must be given internally. Quinine in $\frac{1}{2}$- to 2-grain doses with 2 to 5 minims of dilute nitric acid three or four times a day. The diet should be bland but nutritious, and stimulants are freely needed in bad cases. In young children milk and barley water, mixed, should be given, in preference to beef tea, as beef tea may cause smarting of the mouth.

Alkaline Emollient and Antiseptic Mouth Wash.

℞ Glycerini acidi carbolici... ... semi unciam (ʒss).
Sodii bicarbonatis drachmas duas (ʒij).
Decocti althææ ad uncias octo (ʒviij).
Misce, fiat lotio. To be used with an equal quantity of warm water.

Another.

℞ Acidi borici drachmas duas (ʒij).
Glycerini drachmas duas (ʒij).
Decocti hordei ad uncias octo (ʒviij).
Misce, fiat lotio.

3. **Parasitic stomatitis, aphthæ, thrush.**—This disease has been confounded with the preceding; it is, however, a special form of inflammation of the mouth due to the development in its mucous membrane of a parasitic, fungous growth, the *oidium albicans*. It commences with dusky redness, heat, dryness and tenderness of the mucous membrane, accompanied by an acid reaction of the buccal secretions; this is followed by the appearance of circular milk-white slightly prominent spots, which run together into irregular flakes or patches, covered with a peculiar

white curd-like secretion. It is found on the dorsal surface of the tongue, on the inside of the lips and cheeks, and especially on the folds connecting the gums with the lips and cheeks; it extends also to other parts of the buccal membrane, and into the pharynx, whence it descends into the œsophagus. It has been found in the stomach and the cæcum (where the secretions are *acid*), and in cachectic states it is not unusual to find it round the anus and genital organs. The mouth is extremely sensitive, and sucking or mastication or any attempts at feeding by the mouth are painful and difficult. Sometimes it is attended by vomiting and diarrhœa. When it supervenes on low cachectic states it is usually of evil omen.

It is most common in infants during the first two weeks of life, and it is generally caused by want of cleanliness and deficient care in feeding, thus inducing a morbid acid condition of the oral secretions. It appears to be often conveyed from child to child by bottle-feeding. In older children, in adults, and old people it is apt to appear towards the close of exhausting, cachectic diseases. It is contagious.

This fungus seems to require an acid medium for its development, and its occurrence in young infants has been supposed to be due to the preponderance of mucus, which is prone to turn acid, over the alkaline saliva, in their oral secretions.

But some regard the acidity of the buccal secretion to be rather a result than a cause of the growth.

The **indications for treatment** in this affection are, apart from those dependent on any co-existing cachexia, to remove the parasitic growth from the mucous membrane, and by restoring a healthy condition of the oral secretion to prevent its re-development. As a *preventive* measure it is desirable to wash out the mouths of weakly infants after suckling, and especially after using the bottle, with a *piece of wet lint* or a camel-hair brush soaked in water. To remove the parasitic patches it is best to rub them off gently with a piece of soft linen wrapped round the

tip of the finger, and then cleanse the cavity of the mouth with some alkaline, antiseptic wash, such as a 5 per cent. solution of borax or sodium benzoate. The following lotion may also be used every two or three hours:—

℞ Boracis } ana drachmas quatuor (ʒiv).
Glycerini }
Tincturæ myrrhæ ... drachmas duas (ʒij).
Aquæ camphoræ ... ad uncias octo (℥viij).
Misce, fiat lotio.

or this:

℞ Sodii benzoatis... drachmas tres (ʒiij).
Sodii bicarbonatis grana centum (gr. c).
Aquæ rosæ ad uncias decem (℥x).
Misce, fiat lotio.

The above may also be used as a spray for the mouth and throat. Honey is to be avoided (as in *mel boracis*), since it may aggravate acid fermentation.

In obstinate cases the patches (after wiping) may be touched with a solution of argentic nitrate (1 to 2 per cent.), or cupric sulphate (2 grains to the ounce), or carbolic acid (2 grains to the ounce). Solutions of sulphurous acid and of salicylic acid, and even of glycerine alone, have been found useful. If there should be diarrhœa, as is not uncommon, small doses of bismuth carbonate with chalk mixture may be given to check it. Forchheimer says small doses of calomel act like a specific in intestinal troubles due to this parasite. With infants, whenever it is possible, a wet nurse should be preferred to artificial feeding. If this is impracticable great care must be observed in the preparation of the infant's food—sterilised cow's milk mixed with a little lime water or a small quantity of a 5 per cent. solution of sodium bicarbonate should be used so as to insure its having an alkaline reaction. Care should also be taken that the bottle, the nipple, and any vessels used in the preparation of the food are thoroughly clean. Plenty of fresh air and good sanitary surroundings should be

secured. If owing to the sensitiveness of the mouth the child refuses to feed, a tube attached to a funnel may be passed along the floor of the nose into the pharynx and fluid nourishment thus administered. When this disease occurs in connection with some general cachexia, tonics and stimulants appropriate to the treatment of the constitutional affection must be given.

4. **Ulcerative stomatitis,** or pseudo-membranous stomatitis.—This form of stomatitis is usually unilateral, and affects most commonly the left side. The ulcers generally appear first on the outer border of the gums, especially of the lower jaw, and on the corresponding surface of the cheek and lip. They may extend to the tongue and palate, and the roots of the teeth are often laid bare by the ulcerative process. The ulcers are covered, as a rule, by whitish or dirty grey necrosed patches of mucous membrane, and surrounded by a red, swollen rim; they bleed easily. The tongue is swollen and thickly furred, indented by the teeth, and ulcerated at its edges. There are usually much fœtor of the breath, salivation, slight fever, and great sensitiveness of the mouth, and consequent difficulty in eating and swallowing. The submaxillary, sublingual, and retro-maxillary glands on the affected side are swollen. If neglected, this disease may cause necrosis of the alveolar processes and disruption of teeth; but when properly treated the ulcers clean and heal rapidly, but leave cicatrices.

This affection is usually found to arise in connection with insanitary dwellings and habits, insufficient and improper food, and other depressing agencies. It is often epidemic in hospitals, schools, prisons, camps, etc. It is especially prone to attack children, particularly feeble ones, between four and ten years of age, after measles. Carious teeth may act as an exciting cause. It is probably contagious and microbic.

The **indications for treatment** are to remove unhealthy surroundings, improve the general health,

and to restore a healthy condition of the buccal cavity, and promote healing of the ulcers by soothing, cleansing, and antiseptic applications. Potassium chlorate appears to exert almost a specific influence over this disease, and it should be given internally and applied locally. Children may take 2 to 5 grains and adults 10 to 20 grains three or four times a day, and it may be prescribed locally in a mouth wash containing 10 to 20 grains to the ounce. This salt when swallowed is said to be excreted unchanged in the saliva. Other useful local applications are washes containing boric acid, salicylic acid, or carbolic acid.

The sensitiveness and tenderness of the mouth may be allayed by adding a little opium to the washes that are used. The mouth should be thoroughly cleansed with warm water after every meal, and the gums and teeth may be cleaned with a bit of absorbent cotton wool. After this it has been recommended to wash the gums with a mixture of 2 parts of glycerine of borax and 1 part of tincture of myrrh. If the ulcers are slow to heal, they may be touched twice daily with a solution of nitrate of silver (10 grains to the ounce), or with dry alum, or with tincture of iodine, or with iodoform. As these applications are very painful, the ulcers may be first mopped with a solution of cocaine hydrochloride. Loose teeth and loose fragments of necrosed bone should be promptly removed.

Tonics of quinine and iron, together with cod-liver oil, will be needed in most cases, with good air and good food; the latter should be nourishing, but unirritating and easy of digestion. During the acute period, milk, beef-tea, soaked bread, and other nourishing fluids will be best.

Antiseptic and Soothing Mouth Wash for Adults.

℞ Potassii chloratis grana octoginta (gr. lxxx).
Extracti opii liquidi ... drachmas duas (ʒij).
Aquæ laurocerasi unciam (ʒj).
Decocti hordei ad uncias octo (ʒviij).
Misce, fiat lotio.

*

Antiseptic Salicylic Lotion.

℞ Acidi salicylici semi drachmam (ʒss).
Spiritus vini rectificati ... drachmas tres (ʒiij).
Aquæ camphoræ ad uncias octo (ʒviij).

Misce, fiat lotio. (Dissolve the acid in the spirit and then add the water.)

5. **Gangrenous stomatitis, cancrum oris, noma.**—This very grave affection is, happily, rare. It occurs in children between three and six years of age, usually as a sequel or concomitant of some exhausting disease in those that are ill-nourished and of a strumous diathesis. Measles and enteric fever are the diseases it most commonly follows. It has also been encountered after whooping cough and typhus. The excessive use of mercury has been said to favour its occurrence. It begins as a swelling of the cheek on *one* side, and spreads over the face. The mucous membrane lining the corresponding buccal surface is found to be ulcerated, and this ulceration spreads to the adjacent gums, so that the teeth become denuded and loosened, and the bone itself may be attacked and undergo necrosis. There is usually a hard, rounded nodule to be felt in the centre of the swollen cheek. A fœtid, gangrenous odour proceeds from the mouth. Gangrenous scars form both externally and internally. These separate and leave a hole in the cheek, exposing the diseased jaw and denuded teeth. Infective broncho-pneumonia often supervenes, and diarrhœa, and the disease is commonly fatal during the second week. Recovery sometimes occurs before the cheek becomes perforated, but ordinarily great deformity is left behind from extensive gangrene of the face, nose, and adjacent parts. It is said to be fatal in at least seventy-five per cent. of cases.

Treatment.—This consists mainly in local cauterisation, under chloroform, with the actual cautery or pure nitric acid.

After carefully drying the parts with lint, sticks should be dipped in strong nitric acid and then rubbed

well into the edges of the sloughing parts, and over the surface of the gums, any loose sloughs being previously cut away and sequestra removed. Care must be taken that the acid does not run over the sound skin. It will be usually necessary to make several applications, the parts being well-dried between each. A little iodoform should be subsequently powdered on and the surface smeared with carbolic oil. Some prefer hydrochloric acid or the acid solution of mercuric nitrate, and others prefer the use of Paquelin's cautery. After cauterisation, antiseptic washes or injections or sprays must be used day and night to cleanse the mouth of dead and decomposing matter.

Beneficial results have been reported from the local application of undiluted carbolic acid, followed by the frequent use of a 2 per cent. wash of the same; one case recovering without perforation of the cheek. Other local applications reported to have been followed by good results are the pure tincture of perchloride of iron, solution of cupri sulphatis (30 grains to the ounce), and subnitrate of bismuth. Successful treatment of this affection has been reported by swabbing the ulcerated surfaces with a 1 in 1,000 solution of perchloride of mercury.

For cleansing the mouth chlorinated soda lotions may be used (liquor sodæ chlorinatæ, 1 ounce; aquæ ad 16 ounces), or a 5 per cent. solution of carbolic acid.

Tonics should be freely given, especially quinine and perchloride of iron; as well as an abundance of nourishing food and stimulants; as much wine and brandy as the child will take—3 to 4 ounces in twenty-four hours for a child of five years. Eggs beaten up with milk, strong soups, wine-whey, pounded meat, are the best foods. Nutrient enemata may be given if sufficient food cannot be administered by the mouth.

The troublesome scars and deformities left behind in cases that recover may be remedied by appropriate surgical treatment.

6. **Mercurial stomatitis,** or mercurial salivation, is caused, as its name implies, by intoxication

with mercury, either given as a medicine, or from contact with the metal in the arts.

The symptoms consist of a peculiar fœtor of the breath, a metallic taste, soreness of the gums and mouth, and profuse secretion of saliva. The lips, the tongue, and the whole of the buccal mucous membrane become involved. The lymphatic glands of the lower jaw are enlarged and painful; the tongue is sometimes greatly swollen, and mastication and swallowing are difficult. If this affection proceeds unchecked, it may take the form of ulcerative stomatitis and occasionally necrosis of the lower maxilla occurs. It varies greatly in severity, and in its manifestations and duration.

The **treatment** of this form of stomatitis requires, in the first place, that the patient should be withdrawn immediately from the influence of the metal. It is said that the administration of potassic chlorate acts as a prophylactic with workers in the metal. This is also one of the best remedies for the disease: 30 to 60 grains a day is usually quickly followed by amelioration and cure. It soon removes the characteristic fœtor. Antiseptic and cleansing mouthwashes are needful, to which some opium may be added (as well as given internally) to relieve pain. The best are solutions of potassic chlorate, creasote water, borax with tinctures of myrrh and cinchona, saponified emulsion of coal-tar, brandy and water lotion (*Watson*). Sometimes a wash of acetate of lead (10 grains to the ounce) proves very soothing, and some think highly of an iodine wash ($\frac{1}{2}$ dram of the tincture to an ounce of water). Cauterisation is occasionally needed either with nitrate of silver or hydrochloric or chromic acid (1 in 5). To check the excessive salivation a tannin lotion will prove serviceable (1 dram of glycerine of tannin to an ounce of rose-water); or this distressing symptom may be controlled by belladonna (5 to 10 minims of the tincture every four or five hours), or a hypodermic injection of atropine ($\frac{1}{120}$ grain) may be given.

Internally, besides potassic chlorate, as already mentioned, tonics are indicated, and nitric acid has been found especially useful—10 minims of the dilute acid with a grain or two of quinine in an ounce of water, three or four times a day.

As mastication may be impossible and swallowing difficult, either fluid or soft pulpy foods must be administered. Milk, beef-tea, whipped eggs, pounded meat mixed with nourishing soups, soaked stale bread made into a thin pap with milk, oatmeal gruel, and other fluid foods, may be given. If swallowing should be especially difficult and painful, nutrient enemata must be administered.

DISEASES OF THE TONSILS.

Tonsillitis.—The tonsils in some persons are very prone to inflammation. Three principal kinds of tonsillitis have been described. First, *a catarrhal or superficial* form in which the mucous membrane only is inflamed, but this is only a part of an ordinary sore throat or catarrhal pharyngitis (angina catarrhalis). *Secondly*, a *follicular* or *lacunar* tonsillitis, when the follicles *especially* are inflamed and plugged with exudation; this also may be a part of a general pharyngitis. Neither calls for any special treatment apart from that of the general affection of the pharynx. *Thirdly*, a *parenchymatous* or *suppurative* tonsillitis; this is commonly known as **quinsy**, and is the form of tonsillitis which will chiefly now occupy our attention.

As to the *causes* of tonsillitis, constitutional predisposition is a very prominent one. Some persons appear to inherit a peculiar susceptibility to inflammation of the tonsils, and will suffer during their lives from repeated attacks. "Scrofula" is particularly apt to be found associated with the more chronic and permanent forms of early childhood; rheumatism and gout with the severe acute forms of youth and adult life. Attacks of acute rheumatism have often been observed to be preceded by attacks of acute tonsillitis; and it is thought probable that the specific

poison of rheumatic fever gains entrance into the body through the tonsils. The exanthemata are associated not unfrequently with tonsillitis; indeed, the belief is gaining ground that the tonsils play an important part in admitting into the system the various pathogenetic microbes that give rise to infectious diseases, while its own affections are doubtless the consequence of microbic activity.

The *symptoms* of acute parenchymatous tonsillitis are highly characteristic. Fever is usually present from the onset, and the temperature often reaches 104° or 105°. Pain, often extending into the ear, and difficulty in swallowing and a feeling of soreness and heat in the throat, call attention to that part, and on looking into the throat one or both tonsils will be found to be red, swollen, and projecting into the pharynx. Both may be involved together; often they will be seen nearly or quite touching one another, and filling up the whole of the entrance to the pharynx; more commonly the inflammation of the second tonsil follows that of the first. The soft palate and uvula share in the inflammation, the mucous membrane being intensely red and inflamed, and the whole uvula being swollen and elongated. The inflamed parts, at first dry, soon become covered with a viscid, sticky mucus, and owing to the obstruction in the throat and consequent difficulty of swallowing, the saliva escapes freely from the mouth. Pain and swelling about the angle of the jaw, which sometimes extends to the adjacent salivary glands, make it difficult for the patient to open the mouth so as to permit of full inspection of the throat, and the forefinger must be introduced to explore the condition of the tonsils. Besides the other symptoms of fever there are usually headache, restlessness, a thickly-coated tongue, foul breath, nausea, loss of appetite, constipation, and scanty, high-coloured urine.

The inflammation of the tonsil may end in resolution or suppuration.

In the former case the parts may be restored to

their natural condition in ten or twelve days, but frequently more or less permanent enlargement of the tonsil remains. In suppurative cases, after four or five days, the occurrence of slight rigors and the complaint of throbbing pain and great tension in the inflamed tonsil, indicate that pus has formed there. Usually the abscess bursts suddenly, sometimes during sleep, and its contents are swallowed; or it is discharged from the mouth, great and immediate relief accompanying this termination.

In the **treatment** of acute tonsillitis much may be done, if the case is seen early, to prevent suppuration, or, when this result is inevitable, to hasten it. In young children, and in some young adults, most acute throat affections are very amenable to the influence of *aconite*. It is of little use in older patients, and its use, in all cases, is pretty well limited to the first twenty-four hours. If it has not had by that time a marked effect on the fever and the throat discomfort it is as well to lay it aside for some other remedy. A child between five and ten years of age should be given 1 or 2 minims of tincture of aconite (or a pilule of aconitine containing $\frac{1}{480}$ of a grain), with a dram of liquor ammonii acetatis and a little syrup of orange peel and water every two or three hours, for six doses; from 10 to 15 years, 2-minim, and above 15 years 3-minim doses may be given. This remedy will sometimes remove rapidly the early inflammatory throat affection in children. A saline aperient should always be given at starting.

For children a powder that is *tasteless* has such an advantage over other medicines that we may give one containing a grain of calomel mixed with 2 grains of sugar, and wash it down with two tablespoonfuls of Dinneford's fluid magnesia mixed with a teaspoonful of syrup of lemons; this mixture makes a pleasant, cooling drink, which may be repeated every hour until the bowels are freely relieved. Mouthfuls of iced milk and water are

useful in this stage, combined with ice-cold compresses externally.

For older patients we think highly of the remedial effects of *guaiacum;* patients who have gone through former attacks with and without this drug know its value, although they dislike taking it. An ounce of the guaiacum mixture of the B.P. should be given every four hours; or a teaspoonful of the ammoniated tincture may be added to half a glass of milk, and this mixture may be used as a gargle and then swallowed. It should be taken every two hours, until it begins to purge; or in mild cases guaiacum lozenges—5 to 6 a day—may be allowed to dissolve slowly in the mouth. *Salol* in large doses has also been highly commended. In very pronounced rheumatic cases sodium salicylate may be given in doses of 10 to 15 grains every two or three hours until relief is felt. Some apply salicylic acid directly to the surface of the tonsils.

The following formula has been suggested :—

℞ Acidi salicylici drachmas duas (ʒij).
Sodii bicarbonatis ... drachmam cum semisse (ʒjss).
Glycerini unciam (ʒj).
Aquæ menthæ piperitæ ... ad uncias quatuor (ʒiv).
Misce, fiat mistura. A tablespoonful every 2 or 3 hours.

An active saline purgative must also be given, such as 2 drams of sodium or magnesium sulphate, with 20 grains of magnesium carbonate in an ounce of peppermint water every four hours until free action of the bowels is established. We have seen advantage follow the addition of 5 minims of ipecacuanha wine to each dose of this aperient mixture, especially when the patient comes under treatment in the more advanced stage, and when it is desired to hasten suppuration.

The attack can sometimes be arrested at the very commencement by scarification of the inflamed tonsil, the incisions being allowed to bleed freely. The subsequent application of a 10 per cent. solution of

cocaine to the surface of the tonsil appears to hasten resolution. When the disease cannot be arrested, cocaine may also be of service in allaying suffering. A 4 to 8 per cent. solution may be sprayed on to the tonsil for a few seconds at a time, the nozzle of the atomiser being introduced between the teeth and directed towards the tonsil. Or a spray of cocaine (1 per cent.) combined with menthol (10 per cent.) dissolved in paroleine, will relieve the pain. The menthol has the advantage of being also an antiseptic. Sucking ice will often afford relief.

In severe cases, and for hastening suppuration, we have found nothing more efficacious than a gargle of *hot* water containing about 2 grains of borax or of sodium bicarbonate to the ounce; the patient should be directed to keep gargling or holding this in his mouth as constantly as possible. Inhaling the steam of hot water, or hot water containing some aromatic substance such as benzoin, camomile, sage, hops, camphor, or opium, is also very useful. Externally profuse hot fomentations, applied frequently with a large sponge, the head and neck being held over a large basin, and in the intervals hot moist sponges fastened round the throat, greatly hasten the progress of the case. If we can distinctly satisfy ourselves that there is a superficial collection of pus which we can easily reach by a guarded bistoury, we should at once let it out, but patients constantly complain of being uselessly put to pain by these punctures, which appear to give no relief. The swollen and œdematous surface of the tonsillar swelling often gives a fallacious sense of fluctuation to the finger, which induces the medical attendant to puncture prematurely.

If the temperature keeps high in cases of acute tonsillitis it is advisable to give full doses of quinine, 4 to 5 grains dissolved in lemon juice and water every 3 or 4 hours, until the temperature is reduced.

After suppuration and discharge of the abscess, tonic treatment is needed—bark and ammonia in

rheumatic cases, or quinine and acid in non-rheumatic cases, or iron and quinine in cases of great debility.

The following antiseptic gargle in acute tonsillitis, after incision, is recommended by Schnitzler:—

℞ Sodii salicylatis ... } ana grana quadraginta (gr. xl).
Boracis }
Aquæ laurocerasi ... drachmam (℥j).
Aquæ destillatæ ... ad uncias octo (℥viij).
Misce, fiat gargarisma.

In children we have seen retrogression of the chronic enlargement, which remains after the acute stage, promoted by the use of Bourboule water, from 2 to 8 tablespoonfuls, according to age, given with a little hot milk night and morning. The employment of a weak iodine gargle (one dram of tincture of iodine and half an ounce of glycerine to 8 ounces of water) is also of use for this purpose, as is the syrup of the iodide of iron with cod-liver oil, especially in scrofulous cases; in which also change to the sea-side, if the season is suitable, with local and general sea-bathing, favours complete recovery.

Food during the acute stage must be fluid, and milk is the best. In the early stage, and whilst there are prospects of securing resolution, the milk should be mixed with ice-water, but in a more advanced stage, and when the object is to hasten suppuration, it should be drunk warm, or even as hot as it can be tolerated, diluted with a $\frac{1}{3}$ part of seltzer or Apollinaris water. Persons prone to repeated attacks of quinsy should be recommended, as a *prophylactic*, to sponge the throat and back of the neck daily with cold water, or direct a cold spray douche over these parts. The throat should also be gargled every morning with cold water containing 2 or 3 grains of borax and a few drops of tincture of myrrh to the ounce.

Chronic enlargement of the tonsils (hypertrophy), which is often found in children and reaches at times to such a degree as to cause deafness and to

seriously embarrass respiration, requires the removal of the hypertrophied organs. Slighter degrees of enlargement following acute tonsillitis may be greatly benefited by iodine gargles (as already suggested) or the rubbing in under the angle of the jaw of soap liniment containing 2 drams of iodide of potassium to the ounce. The local application of glycerine of tannin is advantageous when the tonsils are soft and spongy. If removal is determined upon, the best instrument for the purpose is Mathieu's guillotine, unless the tonsils are very large, long, and narrow; then it is best to use the vulcellum forceps and a blunt-pointed bistoury. Excessive bleeding may be stopped by the application with the finger of a powder composed of one-third alum and two-thirds tannin.

In the **follicular tonsillitis** which often accompanies certain forms of pharyngitis, a gargle of creolin has been found very useful. The throat should be gargled several times a day with equal parts of a 1 per cent. solution and warm water. The pricking sensation it leaves in the throat may be relieved by gargling afterwards with pure warm water.

Diseases of the Pharynx.

Acute pharyngeal catarrh (*sore throat, angina*).—In this disease, as in tonsillitis, the inflammation is not confined to any special part of the throat, but extends usually to the *whole* throat. The soft palate and uvula are almost invariably affected, and the faucial arches often more so than any other part; the catarrhal state also commonly extends to the back of the nose (post-nasal), into the mouth and to the epiglottis and larynx. Hence the more general term "sore throat" is preferable.

Usually, and in mild forms, there is simply an erythematous inflammation of the mucous membrane of the pharynx, palate, and tonsils, which, under favourable conditions, subsides in a few days. In more severe cases there is more swelling and great relaxation of the mucous membrane, which may be

intensely congested and œdematous. The mucous follicles are often swollen, and the mucous membrane is usually covered with a secretion of dirty-looking, dryish, sticky mucus. The uvula also is elongated and swollen. Suppuration (suppurative pharyngitis) is apt to occur in enfeebled persons, as well as in severe traumatic cases. Ulceration (ulcerative pharyngitis or ulcerated sore throat) frequently occurs, especially in septic cases.

The most common *cause* of the simple forms of acute pharyngitis is exposure to cold and damp: the ulcerative forms (when not specific) are usually caused by breathing a septic atmosphere, as in the so-called "hospital throats," "drain throats," etc. Pharyngitis may, of course, be caused by contact with mechanical and chemical irritants in the solid, liquid, or gaseous form; or may be excited by the contact of highly-heated steam or other hot fluid or solid substances. It accompanies most of the exanthemata, and in scarlet fever occasionally assumes a very serious aspect. It is sometimes epidemic, and may accompany epidemics of true diphtheria.

It is doubtless in many cases due to microbic infection: in others it is associated with the rheumatic or gouty diathesis.

The *symptoms* commonly complained of are heat, dryness, tension, and uneasiness in the throat; some dysphagia, slight modification of the voice, and occasional hoarseness. There is usually some fever, and in some persons, if the temperature is taken in the mouth, it will be found out of all proportion to the general constitutional state. We have often observed a temperature as high as 104° F. for a few hours during the height of the inflammation; 101° to 102° is, however, far more common. In cases which are referrible to chill there is often complaint of pain or aching in the back and limbs; the cervical glands are occasionally swollen.

The **treatment** of the milder cases of superficial pharyngitis is simple. Confinement to the house and

the strict avoidance of exposure to cold currents of air are essential. If the bowels have not been freely relieved, and if the tongue and mouth are foul and sticky, a saline aperient should be given—a seidlitz powder, or 3 or 4 ounces of Dinneford's fluid magnesia with a teaspoonful of lemon-juice, will often be sufficient. This is often, however, advantageously preceded by a pill of 1 grain of calomel and 2 grains of extract of henbane. If there has been troublesome constipation before the attack a stronger dose will be needed, and an ounce and a half of the mistura sennæ composita may be ordered. If the attack has been brought on by exposure to cold and damp, and is accompanied by pain and aching in the limbs, a diaphoretic draught should be given at bed-time, and the patient be enjoined to keep his room at least for a day or two This draught may consist of :—

℞ Salicini grana quindecim (gr. xv).
Liquoris ammonii acetatis drachmas tres (℥iij).
Spiritus ætheris nitrosi ... drachmam (℥j).
Aquæ camphoræ... ... ad unciam cum semisse (℥jss).
Misce, fiat haustus. To be taken at bed-time.

If there is much *pain* in the throat, an eighth to a sixth of a grain of acetate of morphine may be added to this draught. In young children, if there is a high temperature, tincture of aconite or granules of aconitine ($\frac{1}{100}$ grain), given in the manner already described for tonsillitis, will often act remarkably well.

In septic cases, with much depression of strength as well as fever, we prefer, after the bowels have been relieved, to give quinine and potassium chlorate in effervescence, as follows :—

℞ Potassii chloratis grana decim (gr. x).
Potassii bicarbonatis grana viginti (gr. xx).
Ammonii carbonatis grana quinque (gr. v).
Syrupi aurantii drachmam (℥j).
Aquæ ad unciam (℥j).
Misce, fiat haustus. To be given every three or four hours with the following powder :—

℞ Quininæ sulphatis { granam cum semisse ad grana tres (gr. jss ad iij).
Acidi citrici grana viginti (gr. xx).
Misce, fiat pulvis.

Half these doses can be given to children between seven and fourteen years of age. The dryness and heat of the throat may be relieved by sucking fragments of ice or sipping iced lemonade. A cold compress applied to the throat is also useful. When associated with rheumatism, salicin and the salicylates are indicated, and when with gout, colchicum and alkalies.

The diet should be light and nourishing, and may consist of milk, of whipped eggs, of oatmeal gruel, of broths, beef-tea, fruit jellies, and the like. When there is much relaxation of the mucous membrane, and much sticky mucus hanging about the throat, great comfort is experienced from the use of an alkaline and astringent gargle such as the following, which cleans away the mucus and braces up the relaxed mucous membrane:—

℞ Sodii bicarbonatis drachmam (ʒj).
Glycerini boracis unciam (℥j).
Potassii chloratis drachmas duas (ʒij).
Tincturæ catechu unciam (℥j).
Aquæ rosæ ad uncias duodecim (℥xij).
Misce, fiat gargarisma. To be used warm.

In cases of intense inflammation, with much swelling of the mucous membrane and great pain, so that gargling is not possible, a spray of warm water containing 5 grains of sodium bicarbonate and 2 or 3 of sodium chloride, and of 20 minims of glycerine of carbolic acid to the ounce, is very comforting.

After cleansing the throat of adherent mucus by a warm alkaline gargle, great comfort may often be given by the application of a 5 to 10 per cent. solution of **cocaine** by means of a camel-hair brush.

Later, when the relaxation of the mucous membrane is chiefly distressing, sprays containing alum (5 grains to the ounce) or tannin (5 to 10 grains to

the ounce), with or without ammonium chloride (5 to 10 grains to the ounce), may be used with advantage.

In some low forms of ulcerative (septic) sore throat, vigorous tonic treatment may be needed, and a mixture containing 2 or 3 grains of quinine and 15 or 20 minims of tincture of perchloride of iron should be given every four or five hours. Three or four glasses of sound port wine are often also needed daily. In these cases the throat should be washed out (the attempt to gargle is too painful) with an antiseptic wash; a saturated solution of boric acid to which a little tincture of myrrh is added will answer the purpose.

The inhalation of vapour of benzoin given off from very hot water charged with about 5 per cent. of the tincture is soothing, but of no great curative efficacy.

Chronic pharyngeal catarrh (*chronic sore throat*).—This has been divided into two varieties according as the glandular *follicles* are or are not conspicuously affected. In the latter case we have (1) *simple chronic catarrhal* sore throat, and in the former (2) *follicular* or *granular* pharyngitis, or clergyman's sore throat.

The chronic form of *catarrhal* sore throat usually follows repeated attacks of the acute disease, and has, therefore, the same etiology. The *follicular* form is predisposed to by sedentary occupations and unhealthy habitations, and the exciting causes are usually excessive use of the voice in speaking and singing, or local irritation from tobacco or alcohol, or food and drinks too highly spiced or too hot, or too hot and too cold together. It sometimes follows acute pharyngitis, and sometimes seems to be chronic from the outset. It is common in the scrofulous, and not infrequent in the rheumatic and gouty.

In *follicular* pharyngitis the pharynx is seen covered with small projections varying in size from that of a pin's head to three or four times this size. Patches of dirty yellowish or brownish adherent

mucus also cover the surface of the mucous membrane. In very old cases of this kind, when atrophy of the glandular structures has taken place, we get a variety known as *pharyngitis sicca* or *atrophic* pharyngitis (dry catarrh). In these cases a scanty, dry secretion is seen covering the thin, hard, glazed mucous membrane.

The **symptoms** complained of in chronic pharyngeal catarrh are an uncomfortable sticky feeling in the throat, with a constant desire to "clear the throat" by coughing or "hacking." There is usually more or less expectoration, and if this is dry and sticky, and not easily detached from the mucous membrane, there may be a good deal of dry irritative cough. The cough is often troublesome on lying down at night, especially when the catarrhal condition extends into the posterior nares. This, we believe, is caused by the larynx, in the horizontal position, falling back against the posterior wall of the pharynx, so that the excessive secretion from the catarrhal mucous membrane *drains*, as it were, into the larynx, or hangs about the glottis and excites efforts at coughing to get rid of it. The voice is often thick and coarse, and the throat gets "fatigued" after much vocal exertion, as in public speaking, singing, etc.

In the **treatment** of chronic pharyngitis, improvement of the general health must be our first consideration. If there is co-existent gastric catarrh we must endeavour to remove this by careful attention to diet and habits and a proper regulation of the bowels. Strong alcoholic drinks and all hot and irritating articles of food must be forbidden, as well as the use of tobacco, which undoubtedly is the cause of much troublesome catarrh, both gastric and pharyngeal.

If there is chronic constipation, a small pill containing half a grain of powdered ipecacuanha, a grain of aloes, and half a grain of soap, should be taken daily immediately before dinner, and a tumblerful of hot Carlsbad water should be drunk

the first thing in the morning. This will cleanse the stomach of adherent mucus and promote its healthy secretions. It is an excellent plan also to drink and at the same time gargle the throat with a warm alkaline water about an hour before each meal—Ems or Vichy water will do.

In scrofulous conditions, as soon as the tongue is clean and the stomach in good order, we should give cod-liver oil and syrup of the iodide of iron, and in anæmic and debilitated cases quinine and strychnine and tincture of the perchloride of iron. In some gouty and rheumatic cases small doses of iodide of potassium with a bitter vegetable tonic will be of use, and in others the alkaline and arsenical Bourboule water will be found of great service; 4 to 6 ounces should be drunk *warm* night and morning, and an hour before dinner; it should be drunk slowly, and kept in contact with the throat while swallowing. Topical astringents are of great value in many cases, but they should not be applied until the throat has been first cleansed from adherent mucus by gargling with a warm alkaline solution.

The free application of a solution of nitrate of silver, from 3 to 10 grains to the ounce, in that form of chronic pharyngitis which follows acute attacks, is exceedingly useful. A solution of chloride of zinc, 5 to 10 grains to the ounce, is also an excellent application, applied daily to the throat with a large soft brush. Some apply a mixture of nitrate of bismuth with glycerine, 10 grains to the ounce, with a brush, and find it relieves the local discomfort; a solution of tannin in ether has been recommended by others. It is said to answer admirably in some cases, as it leaves a thin film of tannin on the surface. All these applications require to be made by a medical man; it is necessary, therefore, to have other resources which we can entrust to the patients themselves. Sprays are very useful for this purpose. Tar-water applied

in this way often renders good service; or a warm solution of borax (8 to 10 grains to the ounce), or a solution of sodium bicarbonate and ammonium chloride of the same strength. In mild, chronic cases gargles are of much service. An ounce of glycerine of borax and half an ounce of tincture of myrrh with 12 ounces of rose-water makes a pleasant and useful gargle.

If the mucous membrane and uvula are much relaxed a good astringent gargle may be made with 5 drams of glycerine of alum, 20 minims of tincture of capsicum, and 8 ounces of the acid infusion of roses.

There are many useful forms of lozenges for these cases; some serve to detach the sticky mucus and promote expectoration and so relieve cough, such as the ammonium chloride lozenges, the Soden pastilles, and the pastilles Dethan (a French chlorate of potash lozenge flavoured with benzoin). Or the astringent lozenges are more useful in other cases, such as the red-gum lozenge, the rhatany, catechu, and tannin with capsicum lozenge.

Guaiacum pastilles are useful in rheumatic forms, and codeine pastilles to relieve the troublesome night-cough so often a source of annoyance.

Old cases of *follicular* pharyngitis are exceedingly difficult of cure. Some specialists recommend applications of very strong solutions of nitrate of silver (1 dram or 2 drams to the ounce), or iodine and carbolic acid (1 dram of each to an ounce of glycerine). The dilated capillaries are said to be sometimes benefited by the local application of the liquid extract of ergot, or a solution of ergotine (10 to 20 grains to the ounce). The local destruction of the enlarged follicles is also a favourite method of treatment, either by such caustics as solid nitrate of silver, or chloride of zinc, or caustic potash, or the incandescent electric cautery.

We have found in the less inveterate cases much service from the use of Bourboule water, as

described above, or the Eaux Bonnes, or the Cauteret water. We have also had good results from a course of treatment at these places. Excellent results are also reported by the physicians at Aix-la-Chapelle, especially from the use of inhalations of the combined spray and vapour of their saline sulphur water. At the same time general tonic treatment is always indicated.

The following has been recommended as a good prophylactic application in "threatened" sore throat.

℞ Acidi tannici grana duodecim (gr. xij).
Tincturæ iodi minima duas (♏ ij).
Acidi carbolici grana triginta (gr. xxx).
Glycerini semi unciam (℥ss).
Aquæ ad uncias tres (℥iij).
Misce, fiat lotio. The throat to be painted with this three times a day.

ADDITIONAL FORMULÆ.

Tonic mixture for ulcerative stomatitis.

℞ Potassii chloratis, ʒiv.
Tincturæ ferri chloridi, ʒv.
Glycerini, ʒj.
Aquæ destillatæ ad ℥xij.
M. f. mist. A tablespoonful four times a day in a little water. (*Whitla.*)

Mouth-wash for spongy gums.

℞ Tincturæ myrrhæ, ʒiv.
Tincturæ krameriæ, ʒiv.
Tincturæ cinchonæ, ʒv.
Tincturæ catechu, ℥ij.
Eau de Cologne, ad ℥vj.
M. Two large teaspoonfuls in a wineglassful of water, to be used as a mouth-wash frequently. (*Whitla.*)

Cocaine paint for pharyngeal hyperæsthesia.

℞ Cocainæ hydrochloridi, gr. iij.
Glycerini, ♏ xxx.
Aquæ destillatæ, ʒij.
M. f. pigmentum. (*Schnitzler.*)

Gargle or spray for acute pharyngitis.

℞ Acidi carbolici, ʒj.
Cocainæ hydrochloridi, gr. viij.
Glycerini boracis, ʒiv.
Aquæ rosæ ad ℥xij.
M. f. gargar. (or spray). (*Whitla.*)

Gargle for acute tonsillitis.

℞ Phenazoni, ʒij.
Potassii permanganatii, gr. iv.
Aquæ ad ℥xii. (*Semon.*)

Application for chronic pharyngeal catarrh.

℞ Iodi puri, gr. iij.
Potassii iodidi, gr. xxx.
Glycerini, ʒv.
M. f. pigmentum. To be applied to the throat. (*Schnitzler.*)

Insufflation for pharyngeal ulcers.

℞ Iodoformi, ʒij.
Coffeæ pulveris, ʒij.
M. f. pulv. (*Schnitzler.*)

Gargle in catarrhal pharyngitis (angina).

℞ Aluminis, ʒjss.
Tincturæ opii, ♏ xx.
Mellis, ʒij.
Syrupi rosæ, ʒiij.
Aquæ ad ℥viij.
M. f. gargar. (*Bamberger.*)

Mouth-wash for mercurial stomatitis.

℞ Potassii chloratis, ʒij.
Tincturæ opii, ♏ xij.
Aquæ laurocerasi, ℥j.
Aquæ ad ℥vj.
M. f. lotio. (*Gosselin.*)

Gargle for relaxed throat.

℞ Tincturæ capsici, ʒss.
Acidi tannici, ʒj.
Infusi rosæ acidi, ℥vj.
Aquæ ad ℥x.
M. F. gargar.

Astringent gargle for relaxed throat.

℞ Aluminis, ʒiv.
Acidi tannici, ʒj.
Mellis, ℥j.
Aquæ rosæ ad ℥viij.
M. F. gargar. (*Pressat.*)

Gargle for chronic pharyngitis.

℞ Glycerini acidi carbolici, ʒiij.
Acidi tannici, ʒij.
Tincturæ capsici, ʒss.
Infusi rosæ acidi ad ℥xij.
M. f. gargar. To be used frequently. (*Whitla.*)

Gargle in chronic pharyngitis.

℞ Ammonii chloridi puri, ʒjss.
Mellis, ʒj.
Syrupi rosæ, ℥j.
Aquæ ad ℥xiv.
M. f. gargar. (*Bamberger.*)

Application for aphthæ.

℞ Boracis, Amyli pulveris ää ʒj.
Glycerini, ʒv.
M. f. applic. (*G. Sée.*)

Gargle in mercurial salivation.

℞ Boracis, ʒij.
Tincturæ myrrhæ, ʒij.
Mellis, ʒiv.
Aquæ rosæ ad ℥viij.
M. f. gargar. (*Brande.*)

As an antiseptic mouth-wash, in various forms of stomatitis, a solution of peroxide of hydrogen, 2 to 10 per cent., has been found very efficacious in cleansing the buccal cavity. It acts by the liberation of nascent oxygen.

CHAPTER II.

TREATMENT OF DISEASES OF THE ŒSOPHAGUS.

ACUTE ŒOSPHAGITIS—Symptoms—Indications for Treatment—SPASMODIC STRICTURE, or Œsophagismus—Causes and Symptoms—Treatment—ORGANIC STRICTURE—Causes—Symptoms—Treatment—Dilatation—Tubage—Gastrostomy—Note on Rectal Feeding.

ACUTE ŒSOPHAGITIS.

THIS is a comparatively rare disease except in association with the swallowing of irritant substances such as caustic poisons, or as a result of direct mechanical injury. It may, however, occur as an extension downwards of an acute pharyngitis or upwards of an acute gastritis, but its importance and treatment would be then subordinate to that of the original disease; the same remark applies to its occurrence as an extension of diphtheria, or as a complication of certain acute specific diseases.

The chief **symptom** of acute inflammation of the œsophagus is dysphagia. Pain is felt along the course of the tube, which may be intensified, if ulceration has occurred, at one particular spot. Attempts at swallowing food may be so painful as to excite spasm and the ejection of the food mixed with mucus, and possibly blood, pus, or shreds of membrane. Thirst and feverishness accompany these symptoms.

The *indications* for **treatment** in this affection are to relieve pain and allay irritation and spasm. Opium must be given to relieve pain, and it may be administered in the form of hypodermic injections of morphine, but if swallowing is at all possible the local contact of a solution of opium with the inflamed mucous membrane is calculated to be very soothing. A solution of cocaine may also be swallowed, if swallowing is possible, or a combination of cocaine and opium. A teaspoonful of iced fluid containing a $\frac{1}{4}$ grain of extract of opium and $\frac{1}{4}$ grain of hydrochlorate of cocaine dissolved in it may be placed in

the mouth and slowly swallowed, every quarter of an hour, until four to six doses have been taken, or cocaine lozenges may be slowly sucked. Another suitable medicine which may be given, after the preceding, is a mixture of oxychloride of bismuth with tragacanth emulsion and a small quantity of opium; this would afford some sort of protective soothing covering to the inflamed mucous membrane.

Food must be given in the form of nutrient enemata so long as the dysphagia is severe. The thirst may be allayed by sucking bits of ice, and as soon as a little iced milk or cream can be taken it should be given. A milk diet should be maintained, or a diet composed of wholly unirritating fluids, until all undue sensitiveness or dysphagia has passed away.

Stricture of the Œsophagus.

Stricture of the œsophagus may be either spasmodic or organic.

1. **Spasmodic stricture, spasm, or œsophagismus.**—Spasmodic contraction of the muscles of the œsophagus arresting the passage of food and drink into the stomach is a neurotic affection, often, but not always, associated with hysteria. We have ourselves observed it most frequently in males, associated with symptoms of the gouty or rheumatic diathesis. Often the exciting cause is hasty eating of indigestible food or drinking too hot or too cold fluids. Sometimes it will occur on attempting to join in a social meal, and the patient is obliged on that account to avoid eating except in private.

The attacks may occur frequently, or long intervals may occur between successive attacks. The attacks sometimes come on quite suddenly and at the beginning of a meal; at other times, after more or less dyspepsia from some error in diet, it occurs on the next attempt to take food. Sometimes the spasm is complete, and neither fluids nor solids can

be taken; at other times fluids can be swallowed, but not solids. Sometimes the spasm is only excited by certain kinds of food. Occasionally much flatulent distension of the stomach and abdomen accompanies the attack. Persistent attempts at swallowing are generally attended by forcible rejection of the food, or they may give rise to severe pain. Exploration with a bougie will usually detect the stricture either at the upper or lower end of the gullet, and sometimes at both ends. When at the upper end the bougie can generally, with a little steady pressure, be made to pass through the constriction, but it is often far more difficult to overcome the stricture when at the lower end. In some cases the bougie passes easily.

The general nutrition is often greatly disturbed, and such patients have frequently a thin and wasted aspect.

The **treatment** of this affection must be determined, to some extent, by the particular constitutional state of which it is the expression. In purely neurotic or hysterical cases anti-spasmodics and nerve sedatives must be given. The bromide of ammonium in combination with valerian is very useful; asafœtida, camphor, musk, valerianate, and oxide of zinc, belladonna, have all been suggested. A *cocaine* spray is useful when the spasm is limited to the upper part of the gullet. In the intervals cold douches to the neck and upper part of the spine will improve the nerve-tone and tend to prevent recurrences.

In gouty and dyspeptic cases, antacids and saline aperients are useful, and these patients can often be got to swallow a dose of medicine when they reject everything else. Local treatment is of great service, and the systematic passage of the bougie will often effect a rapid cure. If there is much hyperæsthesia the tip of the bougie should be dipped in a strong solution of cocaine. It is often desirable to make the patient take food in the presence of the physician;

it gives him confidence and overcomes his nervousness. The passage of the bougie, or stomach tube, through which the patient can be fed, should be repeated from time to time until the tendency to spasm has been completely overcome.

The diet, in dyspeptic cases, must be carefully looked to, and those articles of food that have been known to excite spasm should be avoided. The food should be simple, nutritious, and easy of digestion; it should be always thoroughly masticated, and eaten slowly and deliberately.

Electrical stimulation of the vagus and counter-irritation along its course or along the spine, as suggested by some physicians, have not appeared to us to be of any real service.

2. **Organic Stricture.**—Stricture, or narrowing of the œsophagus, may be caused by any injury which produces loss of substance, ulceration, and subsequent cicatrisation of its coats, as by caustic substances swallowed accidentally or purposely, or by mechanical injury, or wounds in whatever manner inflicted. Stricture of the œsophagus may also arise from syphilis. It is said to arise occasionally from hypertrophy of the muscular and connective tissue, caused by the chronic œsophagitis of spirit drinkers. The presence of morbid growths (cancerous, papillomatous, or fibroid) in the œsophagus may be the cause of stricture. The œsophagus may also be compressed from tumours arising externally to it, as from enlargement of the thyroid body, or of the cervical or bronchial or mediastinal glands; from cervical or mediastinal abscesses or cancerous or other tumours; from aneurisms; from exostoses.

Stricture may occur in any part of the œsophagus, but is most frequent in the lower third. Above the constriction the walls are thickened and the *canal dilated*—below it, on the contrary, the walls are usually thinned and the canal collapsed.

The characteristic **symptom** of œsophageal stricture is *difficulty* in swallowing. When the con-

striction is only slight this difficulty may not be constant, and may only occur when large masses of solid food are passed into the gullet; small quantities of quite soft food and fluids may pass easily. As the stricture grows narrower difficulty may be experienced in every attempt at swallowing—more, however, at one time than another—but small portions of well-masticated solid food may still be swallowed with no great difficulty if washed down with some fluid. As the disease advances, however, the deglutition of all solids becomes impossible, and only fluids can be swallowed; and finally, in incurable cases, this may also become impossible. Together with dysphagia there is usually regurgitation of the food mixed with frothy mucus, and as the œsophagus often *dilates* into a pouch of considerable size above the stricture, food may be retained there for some time and regurgitated in a state of decomposition. Food regurgitated from the œsophagus is usually *alkaline*, unlike that regurgitated from the stomach, which is acid. If the obstruction be cancerous, fragments of the morbid growth, with pus and blood, and brownish and frothy mucus, may also be discharged with the regurgitated food. Great emaciation and obstinate constipation are usually present, and other symptoms may appear, not peculiar to this disease, but dependent on the special cause, which may be giving rise to pressure on adjacent structures. The attempt to pass an œsophageal bougie will demonstrate the existence of the stricture, and its situation and extent.

The **treatment of stricture** of the œsophagus, when of a non-malignant and cicatricial character, consists in attempts at dilatation by the passage of bougies gradually increasing in size. Great care must be used in passing these instruments, and no attempt at forcible dilatation must on any account be made until we are assured that the stricture is not due to carcinomatous disease or to external pressure as of aneurism. In such cases any attempt at the forcible passage of a bougie may be attended by very serious

results. If attempts at mechanical dilatation are well borne, instruments for this purpose may be passed daily, or on alternate days, or at longer intervals, according to the toleration of the patient. The dilating sound, or bougie, should be retained in the canal for a few minutes, and when withdrawn an instrument of still larger size should be introduced for a moment and then removed. This last dilator should, preferably, be hollow like a stomach tube, so that a meal of fluid or semi-fluid food can be given by it, and the œsophagus thus kept quite at rest for some hours. When the canal has been sufficiently dilated to allow of free deglutition, the frequent performance of the operation may be discontinued; but the bougie should be still passed from time to time, every week or so, to ascertain that the dilatation is maintained. Continuous dilatation has been maintained by passing a tube through the nose and retaining it in the œsophagus for weeks and months. More risky measures which have been suggested and employed are (1) forcible dilatation by a double-bladed metallic sound; (2) destruction of cicatricial tissue by caustics; and (3) division of the stricture by internal œsophagotomy.

Iodide of potassium may be given in cases in which a syphilitic origin seems possible.

In cancerous cases opium will be needed to relieve pain. Small pills composed of opium and creasote or thymol are useful, both for their anæsthetic and antiseptic properties; or hydrochloride of cocaine may take the place of opium if it seems desirable. The following is the formula for these pills:—

℞ Opii extracti (*vel* cocainæ hydrochloridi), gr. iij.
Creasoti, ♏iij (*vel* thymol, gr. vj).
Pulveris saponis, quantum sufficiat.
Ut fiat massa in pilulas duodecim dividenda. One every hour to relieve pain.

These small pills will probably dissolve in the œsophagus; they may be swallowed with a teaspoonful of iced water.

Hypodermic injections of morphine may be necessary in many cases.

The continuous administration of **arsenic** in small doses is credited with the power of retarding the progress of malignant disease, and there can be no objection to trying it in these cases. Small pilules of arsenious acid ($\frac{1}{60}$ grain) or of arseniate of soda ($\frac{1}{24}$ grain) may be taken twice or three times a day.

The food in these cases must be adapted to the powers of deglutition or to the capability of a feeding-tube being introduced into the stomach. So long as milk and fluid foods can be introduced into the stomach, the life of the patient may be sustained in this way; but when the stricture becomes absolutely impassable, feeding by nutrient enemata must be resorted to. It will, indeed, generally be necessary to have recourse to occasional feeding by the rectum some time before the stricture has become quite impassable; and it has been often noticed that after three or four days of exclusive rectal feeding, together with rest in bed, the patient has been again able to take fluid food by the œsophagus.

During the course of these cases the bowels will require to be relieved by enemata, and it is a good plan to early establish the habit of washing out the bowel daily with a pint or pint and a half of water having a teaspoonful of common salt dissolved in it.

In cases of malignant stricture, when it is no longer possible to swallow even fluid food, either of two resources may be adopted in order to prolong life. These are (1) the method of *tubage* originally suggested by Dr. Krishaber, of Paris, and modified by Mr. Charters J. Symonds, of Guy's Hospital; and (2) *gastrostomy*.

Mr. Symonds' method is to pass through and retain in the stricture a short, funnel-shaped tube, the upper expanded part of which rests on the top of the strictured portion of the canal. It is passed down to the stricture by means of an ordinary conical bougie fitted into the funnel, and after the funnel

tube is fixed into the stricture the bougie is withdrawn, a strong silk thread having been previously fastened to the funnel end of the tube long enough to extend beyond the mouth and to be looped over the ear, behind which it is fixed by a piece of strapping. These tubes are made of gum elastic; they are 6½ inches long, the funnel end is ½ to ¾ inch in diameter; it ends in an ordinary catheter end and eye. Mr. Symonds maintains that this tube has proved of the greatest service in the treatment of malignant stricture of the œsophagus, upon which its pressure produces no irritating or injurious effects. It is prevented slipping down through the stricture by the silk cord attached to it, as well as by the funnel expansion, and by means of the cord it can be easily withdrawn. Its advantages over the long tube projecting from the mouth are obvious; it is not unsightly, it does not interfere with deglutition in any way, it does not irritate the larynx, and it does not cause a constant escape of saliva from the mouth. In the first case reported by Mr. Symonds the patient was kept alive for eight months in comparative comfort, and never felt any inconvenience from the tubes; the stricture dilated considerably, and on post-mortem examination no injurious effect could be traced to its pressure. In the latter stages of the disease it was necessary to remove the tube frequently, as it became blocked with sputum and food. Life has been prolonged for periods varying from four to eleven months by the use of these tubes. The tubes do not usually require changing oftener than every three or four weeks; No. 12 or 14 is the size usually worn. They are durable, and the same tube and silk have been used for more than three months. Mr. Symonds appears to think that the use of these tubes will generally obviate the necessity of having recourse to gastrostomy, with its attendant dangers, and the distress from excoriation of the skin around the external orifice of the gastric fistula.

It is only, then, in cases in which the application

of *tubage* seems quite impracticable that the operation of *gastrostomy* should be resorted to. It should also be always borne in mind, that although when first admitted into the hospital a patient may be quite unable to swallow, yet that after a day or two's rest in bed and the administration of nutrient enemata with opium, the power of swallowing will often be to some extent restored.

Many cases have been reported of malignant stricture of the œsophagus in which gastrostomy appears to have prolonged life, in a state of comparative comfort, for considerable periods, during the whole of which time no food has been taken except through an artificial opening in the stomach. It is no doubt best, when gastrostomy is the only means available to relieve the patient's distress and to prevent him dying of starvation, a fate which absolutely stares him in the face, that the operation, in order to be successful, should be done before the patient's strength and endurance are exhausted.

Note on feeding by the rectum.—We shall so frequently have to recur to the subject of rectal feeding that this seems the best place to offer a few remarks on that subject. It is important to remember that the lower part of the large intestine does not exert any *direct* digestive action on alimentary substances introduced into it. It can only absorb water and salts and predigested, *i.e. peptonised*, substances. It is, therefore, very doubtful, when enemata of beef tea and of milk are given, whether they are of any real nutritive value, as it is probable that only the water and salts are absorbed. They are stimulating, however, and allay thirst, and must not be regarded as useless. Wine and alcohol can also be absorbed by the large intestine.

But food given by the rectum in order to be absorbed should be *peptonised*, and it is also necessary that the rectum be washed out with an enema of tepid water before each nutrient injection. It is also desirable to avoid using a syringe. A funnel, or

irrigating vessel, is best. Nutrient suppositories are of doubtful value; we have known instances in which the large intestine has been found crammed with them on post-mortem examination. Nutrient enemeta should be given by means of a tube about 10 or 12 inches long (not too flexible, or it may bend back on itself), passed as high up as possible, so that the fluid may be brought into contact with as large an extent of absorbing surface as practicable, and the patient should be, preferably, on his left side, with his hips raised on a pillow, and the injection should be allowed to flow in very slowly. The superior rectal and sigmoid veins communicate with the portal system, while the veins from the lower $\frac{1}{3}$ of the rectum communicate with the inferior vena cava, and their contents do not pass to the liver; hence the advisability of introducing nutrient enemata as high up as possible. Not more than 4–6 ozs. should be injected at a time, and less, of course, in a child. The patient should remain recumbent for an hour after the injections, and it is advisable to compress the anus for 10 or 12 minutes with a warm towel, so as to promote the retention of the enema. We may mention some suitable forms of nutrient enemata. Dujardin-Beaumetz advised the following:—The yolk of an egg is beaten up with a glass of milk, and to this is added either two dessertspoonfuls of solid peptones or two tablespoonfuls of liquid peptones, 5 drops of laudanum, and, if the peptones are acid, 7 or 8 grains of bicarbonate of soda. The secretion of the large intestine is alkaline, and acids irritate it, and in cases where prolonged alimentation by the rectum is necessary all irritation of its mucous membrane must be carefully avoided.

Catillon kept a dog alive in good condition for thirty-seven days by rectal injections consisting of, daily, two lavements, each composed of three eggs and a dram and a half of liquid glycerine of pepsine; given without the pepsine the dog wasted rapidly, and when this was replaced by fluid blood he rapidly sank.

Daremberg, in a case of stricture of the œsophagus, kept a patient alive for fourteen months, and with a daily excretion of urea amounting to from 225 to 300 grains, by means of peptonised enemata made in the following manner: Into a glass or other suitable vessel introduce 7,500 grains of meat as lean as possible, minced fine; pour on this about 100 ounces of pure water and an ounce of hydrochloric acid of a density of 1·15. To this add 40 grains of the purest and best pepsine. Digest this mixture for four hours at a temperature of 112° F. Then pour it into a vessel of porcelain and let it boil, adding meanwhile a solution of bicarbonate of soda (17 grains to the ounce) until the mixture has a slight alkaline reaction; this will require 5 to 6 ounces of the solution. Strain the liquid through fine linen and express the insoluble residue; then concentrate the whole in a *bain marie* to 50 or 60 ounces. Half this is given by the rectum daily.

Ewald maintains, in opposition to the generally accepted opinion, that peptonisation is not necessary to insure the absorption of nutrient enemata. His formula is to beat up 2 or 3 eggs with a tablespoonful of cold water; to boil as much of the very best flour as will go on the point of a knife with a 20 per cent. solution of grape sugar, and add a wineglassful of red wine; then to stir the egg slowly into this mixture when it has cooled. Dreschfeld uses 2 raw eggs beaten up with 2 ounces of beef-tea and occasionally an ounce of brandy. Jaccoud uses the yolks of two eggs, 8 ounces of *bouillon*, 3 ounces of wine, and 1 to 4 drams of dry pepsine. The following is a useful form, and is easily prepared: Beat up 2 eggs with 3 or 4 ounces of warm milk, add a dessertspoonful of liquor pancreaticus and 20 grains of sodium bicarbonate. A tablespoonful of brandy may be added. The addition of chloride of sodium is said to promote the absorption of eggs in enemata, 15 grains to each egg.

Prof. A. H. Smith advocates the use of defibrinated

blood as the best rectal food. He injects 3 ounces every four hours. He has observed that it is rapidly absorbed, and in cases of hæmatemesis he thinks it the most efficacious remedy for overcoming the profound anæmia usually present. An obvious objection to this enema is the difficulty of obtaining it when required.

Another good nutritive enema may be prepared with 4 ozs. of warm peptonised milk, the yolks of 2 eggs, half a teaspoonful of common salt, a teaspoonful of arrowroot first carefully mixed with an ounce of warm water, and a dessertspoonful of brandy.

Nutrient enemata should be given warm, about 98° to 100° F.

Should the rectum be very irritable, 5 to 10 minims of tincture of opium may be added to each enema as well as to the injection of tepid water with which the rectum is previously washed out.

The apparatus depicted on this page (Fig. 1) is

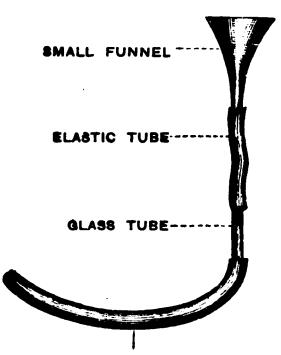


Fig. 1.—Apparatus for Rectal Feeding.

recommended for rectal feeding by Mr. Jones-Humphreys.* It consists of a small funnel, a piece of elastic tubing $\frac{1}{8}$th of an inch in diameter, a glass tube

* *British Medical Journal*, April 26th, 1890.

4 inches long, by which the fluid can be watched descending; joined on to this is an ordinary flexible catheter. The fluid is slowly forced into the rectum by atmospheric pressure. Absorption, though slow, is said to be efficient. Mr. Jones-Humphreys claims for this method simplicity (the patient being able to easily pass the catheter into the bowel himself), cheapness and cleanliness. The slowness of the passage of the fluid he does not consider an objection.*

* Further details on this subject will be found in the author's work on "Food in Health and Disease" (new edition), p. 544.

CHAPTER III.

DISEASES OF THE STOMACH—TREATMENT OF ACUTE AND CHRONIC GASTRIC CATARRH.

ACUTE GASTRITIS, OR ACUTE GASTRIC CATARRH.—Causes—Symptoms—Indications for Treatment—Lavage—Emetics—Purgatives — Rest — Careful Diet — Ice-bag — Counter-irritation—Opiates and Sedatives—Alkaline Effervescents—Calomel—Care in Convalescence. CHRONIC GASTRIC CATARRH. — Causation — Symptoms — Indications for Treatment — Lavage—Emetics—Purgative and other Mineral Waters—Anti-fermentives—Bismuth—Object and Use of Alkalies—Iron in Anæmic Cases — Hydrochloric Acid and Pepsin—Aperients—Dietetic Management. Additional Formulæ.

ACUTE GASTRIC CATARRH.

THIS disease has also been termed "inflammatory dyspepsia," and it *is* a form of dyspepsia inasmuch as it usually arises in connection with some difficulty in the process of stomach digestion. One of the most common predisposing causes of acute gastric catarrh is a defective secretion of gastric juice, which is either deficient in quantity or defective in quality; hence arises abnormal decomposition of the ingesta, owing to their undue detention in the stomach, and thus is set up irritative inflammation of the mucous membrane. Such a condition usually accompanies febrile maladies, and it also occurs in feeble and debilitated anæmic states; and so it happens that quite slight errors in diet will prove sufficient to excite an acute gastric catarrh in convalescents from exhausting diseases, and in the weak and anæmic. Ewald says, "a convalescent patient gets acute gastric catarrh from a beefsteak which the same man manages easily when he is well." He also believes in an inherited tendency to this affection.*

Persons who have suffered from malarial affections, and gouty and rheumatic persons, are also

* We do not propose to consider here the treatment of cases caused by irritant poisons, mineral or vegetable, as that subject pertains to Toxicology.

predisposed to attacks of this disease. The *exciting* cause of attacks of acute gastric catarrh is commonly to be found in some error in diet. The food may simply be excessive in quantity, so that the gastric juice secreted is not sufficient to digest the whole of it, and the undigested residue undergoes abnormal decomposition within the stomach; or the food may be of coarse and indigestible quality, and the gastric mucous membrane may, at the same time, be constitutionally sensitive and irritable; or the food may be difficult of digestion on account of imperfect mastication, so that the gastric juice cannot penetrate it; or the same may be the case from the food being soaked with fat or rich sauces. Or the articles of food and drink may be in themselves irritating, from being too hot or too cold, or too pungent, or in a state of decomposition, and the products of albuminous decomposition act as powerful irritants to the stomach. The stronger alcoholic beverages are especially prone to set up gastric catarrh; too long use of certain medicines (arsenic especially); "catching cold" in certain persons; the painful emotions, anxiety, fear, anger, etc.: all these seem to be capable of exciting catarrh of the stomach.

The continued and habitual use of narcotics, such as opium, by diminishing both the secreting and the propelling force of the stomach, may lead to retention and abnormal decomposition of the ingesta, and so excite gastritis.

In certain cases of blood contamination in infective and other diseases it is probable that tox-albumins may be *excreted* by the stomach and then exert a direct irritant action on the gastric mucous membrane.

Acute gastric catarrh may, of course, also occur as a consequence of other gastric diseases, simple or malignant.

The foregoing are the **causes** we shall chiefly have to bear in mind in considering the appropriate treatment of cases of acute gastric catarrh.

The **symptoms** which usually accompany this disease are the following :—

A sense of fulness and uneasiness in the stomach, with flatulent distension and tenderness on pressure over the epigastrium. A coated tongue, foul breath, a bad taste in the mouth, thirst, loss of appetite, increased flow of saliva, nausea, and "heart-burn," accompanied by eructations of sour, acrid, fœtid substances resulting from the morbid decomposition of food in the stomach. In severe cases there is vomiting, the vomited matters consisting of altered food, mucus, bile, and occasionally streaks of blood. If the catarrh of the mucous membrane extends to the duodenum there may be some icteric discoloration of the skin from involvement of the orifice of the common bile duct. Sometimes there is constipation; at other times, when the catarrhal condition extends to the small intestine, there is diarrhœa. The urine is scanty and high-coloured, and deposits urates. In addition to the *local* symptoms there are usually general malaise and bodily and mental depression, severe frontal headache, coldness of the extremities, and often patches of herpes on the lips. To *severe* cases of this kind, with some rise of temperature and a quick pulse, the term "gastric fever" has often been applied. The depression and other nervous symptoms observed in connection with this malady may be due to the absorption of poisonous substances generated within the alimentary canal.

The **indications** for **treatment** in acute gastric catarrh are the following :—

1. To remove from the stomach any irritating substances that may be retained there.
2. To rest the inflamed stomach as completely as possible.
3. To administer only fluid, unirritating, and easily absorbed food, in small quantities at a time.
4. To apply such direct remedies as will relieve the pain, hyperæmia, and irritation of the gastric mucous membrane, prevent morbid decomposi-

tion of the ingesta, and correct excessive acidity when it exists.

5. To enforce the observance of sound dietetic rules, during and after convalescence, so as to guard against a return of this malady.

1. When it is evident that the gastric catarrh is excited or maintained by the presence of decomposing food in the stomach, means must be taken to remove it. In cases where there is obvious dilatation of the stomach, as well as acute catarrh, it will probably be best, by means of the stomach pump or the siphon tube,* to empty and then to wash out the stomach with some warm, weak alkaline solution, so as to detach and carry away any sticky, ropy mucus which may be adhering to the mucous membrane. Ems or Vichy water, or a weak solution of bicarbonate of soda (3 grains to the ounce), will do for this purpose. When there are objections to, or difficulties in, the application of this method, it may be useful to give an emetic, especially in the case of young children and persons who vomit easily. From 5 to 20 grains of powdered ipecacuanha, according to age, in from one to four tablespoonfuls of warm water, will act well with most persons, and with care in the subsequent treatment it will rarely be necessary to repeat this. Some prefer to give a hypodermic injection of $\frac{1}{24}$th to $\frac{1}{12}$th of a grain of *apomorphine*, but it must be borne in mind that this drug is very depressing to some persons. Others advise giving large draughts of warm water, and if this is not vomited, to promote vomiting by tickling the fauces with a feather, so that the water may be rejected, and the irritant contents of the stomach thus washed away. In other cases we may succeed in emptying the stomach by means of mild purgatives, together with gentle manipulation or massage of the stomach; the pressure on the distended organ being directed from left to right, *i.e.* from the cardiac towards the

* *See* the chapter on Dilatation of the Stomach, p. 102 *et seq.*

pyloric end. By mild measures of this kind, together with complete abstinence from solid food, we may be enabled to empty the stomach of its contents in a manner perhaps more agreeable to the patient than by either of the preceding ways. A suitable aperient for children is the compound rhubarb powder, 10 to 20 grains, and for adults 1 or 2 drams of Carlsbad salts dissolved in warm water, twice a day. When we have succeeded in cleansing the stomach from all irritating contents we have

2. *To enforce rest of the inflamed organ.* In severe cases the entire exclusion of all food from the stomach for two or three days will be of great service. Nutrient enemata should be administered, the patient should be kept in bed, and allowed simply to sip iced water, or to suck small fragments of ice. If there should be any craving for food, or any restlessness or pain, a morphine suppository, or the addition of a few drops of tincture of opium to each enema, will usually relieve these symptoms.

When such complete abstinence is not indicated, or is impracticable, then we must limit the food to bland nutritious fluids, given cold, and in small quantities at a time, such as a few spoonfuls every hour of equal parts of milk and lime-water iced, or milk and Vichy water, or one or two tablespoonfuls of thin water arrowroot three or four times a day.

A strict diet of this kind will, when the patient is kept at rest in bed, suffice for a few days, and the stomach will be thus maintained almost in a state of complete physiological rest.

3. The third indication is practically a continuation of the second, and directs us to exercise the greatest caution in regulating the diet while the acute condition is passing away, giving only the lightest kinds of food in small quantity at a time and if necessary in a predigested form.

4. The fourth indication applies especially to medicinal treatment. It is rarely necessary to abstract blood locally by applying leeches (two or

three) to the epigastrium, as has been suggested; this measure may, however, be found useful occasionally in febrile cases with much local pain and irritability. A poultice should be applied after the leeches have been removed. The application of cold compresses or of the ice-bag to the epigastrium is a favourite remedy with some physicians. This measure, together with sucking small fragments of ice, is often efficacious in arresting vomiting, while it also relieves thirst. A mustard poultice to the epigastrium is sometimes useful and more agreeable to patients than the ice-bag. Pain must be relieved by opiates, or by a combination of opium and hydrocyanic acid, together with bismuth, which is an excellent gastric sedative. When the pain is acute a hypodermic injection of morphine, $\frac{1}{6}$ or $\frac{1}{4}$ of a grain, will be attended by immediate relief, and this is the best way of administering a narcotic in cases where the stomach still contains irritating substances. But when the stomach is known to be free from irritating contents, the irritation attending the inflammation of the mucous membrane is, perhaps, better allayed by giving opium by the stomach. The following is a suitable prescription for adults:—

℞ Bismuthi salicylatis (*vel* oxychloridi) ... gr. xxx.
Extracti opii gr. ij.
Acidi hydrocyanici diluti ♏xviij.
Sodii bicarbonatis ʒj.
Mucilaginis tragacanthæ ʒj.
Aquæ ad ʒvj.

Misce, fiat mistura. Two tablespoonfuls every three or four hours.

When there is a great tendency to vomiting (without much local pain), and distressing thirst, effervescing drinks are often very useful and grateful to the patient. The following may be prescribed:—

℞ Sodii bicarbonatis ʒ iij.
Aquæ laurocerasi ʒiv.
Aquæ ad ʒviij.

Misce, fiat mistura.

℞ Acidi tartarici ʒij.

Divide in pulveres octo. A powder to be dissolved in a tablespoonful of water, and added to two tablespoonfuls of the mixture, and taken while effervescing every hour or two.

The eructations of gas which follow the introduction into the stomach of such alkaline effervescent fluids are useful in bringing away other deleterious gases which may have collected there. The excess of alkali is also useful in neutralising the contents of the stomach when acid, and in loosening and detaching tough ropy mucus which may have accumulated on its surface. Indeed, if the patient complains of *sour* eructations, we should give the alkaline carbonates freely to relieve this.

We must be cautious how we attempt to arrest the *diarrhœa* which occasionally accompanies such cases as we are considering. This is often a conservative measure, and carries away offending substances, and by unloading the tributaries of the portal vein it tends to reduce the hyperæmia of the gastric mucous membrane. Indeed, some physicians have recommended that it should be encouraged or induced by the administration of ipecacuanha and calomel. Ewald is "a great advocate" of calomel in these cases.* A few grains of calomel may be mixed with a little sugar of milk and placed dry on the tongue, and followed by 2 or 3 ounces of fluid magnesia or Apenta water. In convalescence and in protracted anæmic cases it is often desirable to augment the activity of the gastric secretion by giving 6 or 8 grains of pepsin with 5 to 10 minims of dilute hydrochloric acid with each meal of animal food. Those rare cases of acute gastric catarrh which can be directly traced to the effects of chill should be treated by diaphoretics, rest in bed for a few days, and restriction of the diet to unirritating fluid foods.

5. Finally, there is the last important indication,

* "Lectures on Diseases of the Stomach," vol. ii., p. 501. Sydenham Society's translation.

which is directed to the avoidance of those errors in diet which may have originally provoked the malady. After recovery we should insist that only easily digested food be taken, in moderate quantity and at sufficient intervals; that the food be eaten slowly and thoroughly masticated. All excess of alcoholic stimulants, all rich entrées, all pastry, and all substances calculated to set up fermentation in the stomach, should be strictly forbidden. Any tendency to constipation must be overcome by regular exercise, suitable food and an occasional aloetic pill or saline aperient.

CHRONIC GASTRIC CATARRH.

Chronic catarrhal inflammation of the mucous membrane of the stomach is frequently a sequel of one or more attacks of acute gastritis, and its causation must in such cases be referred to those influences which produce the acute affection. The chronic form of gastric catarrh is, however, especially prone to follow the abuse of tobacco and of alcoholic beverages, and particularly the use of ardent spirits and acid wines; it is often due to the habitual indulgence in excess of food, or in articles of diet of a pungent, indigestible, exciting, and irritating character, or to the abuse of drugs. Briefly, errors in diet, long continued, are the chief causes of chronic gastric catarrh, which Ewald describes as "the best-fostered and widespread of this world's ills!" Those persons, also, who in their occupations are compelled to "taste" things, as wine "tasters," tea "tasters," and cooks, are subject to this disease. Persons who eat too rapidly, who drink too much at meals, and so over-dilute the gastric juice; those who eat pastry made with rancid fat, or who take large quantities of sugar, are apt to suffer from chronic gastric catarrh. Feeble, anæmic, and chlorotic patients, with weak digestive powers owing to defective secretion of gastric juice, which is either deficient in quantity or defective in quality, and in whom the digestion of food is thereby retarded and

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the ingesta are detained so long in the stomach as to undergo morbid decomposition—these also are subject to chronic gastritis.

It accompanies certain chronic diseases, such as phthisis and those disorders which are attended with obstruction in the portal system, as hepatic cirrhosis, or those chronic structural changes in the heart and lungs which lead to dilatation of the right side of the heart and obstruction to the outflow from the inferior vena cava and the hepatic veins. All these morbid states cause passive hyperæmia of the gastric mucous membrane, and so induce chronic gastric catarrh. It occurs also in those diseases in which excretion is defective, as in gout and renal affections.

The **symptoms** which accompany chronic gastric catarrh resemble in many respects those of simple functional dyspepsia; but in the cases we are now considering these symptoms often depend upon structural alterations in the mucous membrane of the stomach, —induration from proliferation of interstitial tissue, and degeneration from fatty change in the cells of the gastric tubules. The patient complains of loss of appetite, of a sense of weight, fulness, or even pain in the region of the epigastrium, increased by taking food. He has flatulent and acid eructations, accompanied by a sensation of heat or burning, extending from the stomach along the œsophagus to the pharynx, and commonly known as "heart-burn."

He often suffers from nausea, and occasionally from vomiting. The vomited or eructated matters are highly acid, and have been found to contain acetic and butyric, as well as lactic acids, and other abnormal products of morbid fermentation, including sarcinæ and torulæ.

In the chronic gastric catarrh of the alcoholic there is usually a morning vomit of watery fluid mixed with mucus, to which the term "pyrosis" or "water-brash" is applied. This consists chiefly of saliva swallowed during the night mixed with gastric mucus, the secretion of saliva in this complaint being

often greatly increased. There is often considerable flatulent distension of the small intestine, due to the presence of food undergoing abnormal putrefactive changes, and although there is generally obstinate constipation, there may be occasionally diarrhœa from co-existing intestinal catarrh. If the catarrhal condition extends to the duodenum and affects the common bile-ducts the symptoms of jaundice may appear. The mouth is often foul, and the tongue dirty and flabby and indented by the teeth at its edges. This, however, is not always the case, and the tongue is not unfrequently small, red, and pointed.

The *urine* usually deposits urates, as well as crystals of oxalate of lime, and occasionaly it is phosphatic. The nervous system usually suffers considerably in well-marked cases. There are great mental as well as physical dulness and lassitude, great depression of spirits, accompanied with much irritability of temper, frequent headache, and now and then distressing attacks of *vertigo*. These nervous symptoms have been referred to the probable absorption of toxins, the products of imperfect digestion. The cardiac rhythm is occasionally disturbed, and the heart's action becomes rapid and irregular. The general nutrition usually suffers considerably, especially in cases of long duration, as absorption from the mucous membrane of the stomach is interfered with by the presence of a layer of tough mucus on its surface, so that the patient emaciates and loses strength.

An examination of the gastric contents after a test-breakfast (Ewald's) shows *diminished* acidity—either no free hydrochloric acid, or only a small quantity. The two ferments, pepsin and rennet, are present; achroödextrin and sugar are abundant, but erythrodextrin is present only in small amount. Much mucus may be found in the contents of the stomach in some patients, but in others it may be absent. When the stomach is washed out in the morning, fasting, the water returned from the stomach usually contains much mucus.

In the **treatment** of chronic gastric catarrh the first *indication* is to remove, if possible, the exciting cause of the catarrh. When it is due—as it so often is—to the abuse of alcohol, abstinence from alcoholic drinks must be insisted upon. When it is a consequence of those organic diseases of the liver, lungs, or heart, which lead to secondary engorgement of the mucous membrane of the stomach, the treatment which is beneficial to those diseases will be also remedial of the catarrh of the stomach. When it has been induced by obvious errors in diet, these must be corrected. When it is a consequence of debility and anæmia, tonics and blood restoratives must form part of the treatment. When it is associated with some incurable organic disease of the stomach itself, or has advanced to the condition of senile atrophy, palliative measures alone are possible.

Besides attending to the preceding indications for treatment, it is also necessary that we should adopt measures for arresting the morbid fermentations going on in the stomach, and for relieving the stomach of all decomposing substances and cleaning its mucous surface of the layer of tough, ropy, tenacious mucus which usually covers it and blocks, as it were, the orifices of the secreting tubules. Other indications are to relieve excessive acidity of the gastric contents when it exists, to allay existing irritation of its mucous membrane, and to preserve it from further irritation by great care in the choice of food and by enforcing such dietetic measures as shall insure to the stomach as much functional rest as is possible.

Let us now consider how the above indications may be best carried out in detail.

In aggravated cases where we have evidence of the retention of decomposing matters in the stomach, one of the most efficacious measures is to begin by emptying the stomach mechanically of its contents by means of the stomach pump or syphon tube, and at

the same time **washing out** the stomach* in the morning, fasting, with some weak warm alkaline solution; for this purpose we may use warm Vichy water, or warm water containing 2 or 3 grains of sodium bicarbonate and 5 or 6 grains of common salt to the ounce, or a weak solution of borax, 3 or 4 grains to the ounce. By this measure we shall not only effectually remove the irritating results of the abnormal fermentation of the food, but we shall also cleanse the mucous membrane of the stomach of the viscid mucus which adheres to it.

When the patient positively refuses to submit to mechanical treatment of this kind, or where we encounter difficulties in carrying it out, other methods of emptying and cleansing the stomach may be adopted. An initial **emetic** of ipecacuanha or of apomorphine, or of warm water, as mentioned on page 45, may be administered; or a better process, in many cases, is to carry away the contents of the stomach through the intestinal canal and wash its surface at the same time by the prolonged and systematic adminstration of **purgative waters**, and especially of mineral waters like those of Carlsbad, Tarasp, and Marienbad, which contain the alkaline sodium bicarbonate as well as the purgative sodium sulphate. The alkaline carbonate neutralises the excessive acidity of the stomach contents, while the aperient sulphate sweeps them away through the intestinal canal without setting up any irritation of the intestinal mucous membrane. These waters must be given in the morning fasting in sufficient quantity to cause several watery stools; in this way the stomach is daily washed and cleansed of all lingering decomposing food and adhesive mucus.

Whenever practicable this treatment is best carried out at **Carlsbad** itself, where the strict diet enforced greatly contributes to the cure; but the same rules

* The technique of this method is described in the chapter on the treatment of Dilatation of the Stomach (p. 114).

and method may be enforced and carried out at home with the frank and obedient co-operation of the patient.

After a time, or when it is clear that a decided aperient action is not needed, but the object is simply to cleanse the mucous membrane of the stomach of the morbid, viscid, catarrhal mucus with which it is covered, then the simple alkaline sodium bicarbonate waters, such as warm Vichy, Ems, or Vals water, or simple hot water, containing 2 or 3 grains each of sodium bicarbonate and of common salt to the ounce, may be used instead of the Carlsbad water. Two or three tumblerfuls should be drunk in the morning fasting, and no food should be taken till an hour after the last glass. "The results from this treatment," says Niemeyer, "are the most brilliant that are ever attained in medicine."

In some chronic, obstinate cases in neurotic, sensitive subjects, in which the symptoms are not very severe, but rather annoying and troublesome from their persistence, the gaseous chloride of sodium waters of Kissingen often prove most efficacious, and appear to agree better than the stronger aperient waters. Ewald considers the chloride of sodium waters are indicated in the cases of chronic gastric catarrh with depressed glandular secretion.

If we use a simple bicarbonate of soda water, it will often be an advantage, especially in gouty subjects, to order a tumblerful as hot as can be drunk comfortably, to be taken half an hour or an hour before lunch and dinner and at bed-time; the object being to wash away all residual mucus or other substances remaining from the previous meal before another is taken, and also to neutralise any excess of acid which may remain in the stomach, and to stimulate a healthy secretion of gastric juice.

Other measures may at the same time be taken to check or arrest fermentive action in the stomach; two of the best remedies for this purpose are creasote and thymol or menthol, given in pills immediately after food. The latter may be prescribed in this form:—

℞ Thymol or menthol gr. j.
Pulveris saponis gr. ij.
Spiritus vini rectificati quantum sufficiat.
Ut fiat pilula. To be taken twice or three times a day, immediately after food.

The following is a good form for giving creasote :—

℞ Creasoti ♏ ss.
Pulveris rhei } ää gr. jss.
Pulveris calumbæ }
Pulveris saponis gr. ss.
Misce, fiat pilula. To be taken twice or three times a day, after food.

In some irritative states of the stomach, with pain and nausea after food, or when there is pyrosis, the preparations of **bismuth**—the subnitrate, the carbonate and the oxychloride—are very useful. These preparations of bismuth not only act as antiseptics and antacids, but they also exert a useful astringent effect on the relaxed and engorged mucous membrane, and probably act also mechanically by affording a sort of protective covering to the irritated mucous surface. It is often advantageous to combine the bismuth with an alkali, especially when there is complaint of "heart-burn," together with acid eructations.

The following is a usual prescription :—

℞ Bismuthi subnitratis gr. xv.
Magnesiæ ponderosæ } ää gr. v.
Sodii bicarbonatis }
In a cachet. Three times a day.

Or it may be prescribed in a mixture as follows :—

℞ Bismuthi carbonatis gr. xv.
Magnesiæ ponderosæ } ää gr. v.
Sodii bicarbonatis }
Mucilaginis tragacanthæ ʒj.
Aquæ menthæ piperitæ ad ℥j.
Misce, fiat haustus. To be taken half an hour before food, three times a day.

An excellent combination for the purpose of relieving the pain and nausea which so often accompany aggravated conditions of this malady is the following :—

℞ Bismuthi carbonatis gr. x.
Acidi hydrocyanici diluti ♏ v.
Liquoris opii sedativi ♏ v.
Mucilaginis tragacanthæ ʒj.
Aquæ menthæ piperitæ ad ʒj.

Misce, fiat haustus. To be taken half an hour before food, or when in pain.

In advanced cases in which there is much irritability of the gastric mucous membrane, and pain after taking food, benefit may also often be derived from the administration of argentic nitrate in combination with small doses of opium. Given in a pill in doses of $\frac{1}{4}$ to $\frac{1}{2}$ a grain, combined with $\frac{1}{2}$ grain of extract of opium, half an hour before each meal, it will often have a valuable sedative effect.

Some American authors recommend an intragastric spray (1 in 1,000) of this salt, or to wash out the stomach with a 1 in 2,000 solution.*

In cases where we find much localised tenderness in the epigastrium the repeated application of small blisters has been found very serviceable.

In mild cases a cure may often be effected by careful regulation and limitation of food, and by the judicious use of alkalies combined with vegetable bitters such as quassia, calumba, gentian, nux vomica, etc. The alkalies neutralise the morbid acidity of the stomach contents, the bitters appear to give tone to the stomach, and both appear to promote the secretion of healthy gastric juice. They should be given about half an hour or an hour before a meal. The following prescription is a useful one:—

℞ Sodii bicarbonatis gr. xv.
Tincturæ nucis vomicæ ♏ xij.
Infusi calumbæ ʒj.

Misce, fiat haustus. To be taken three times a day an hour before food.

It is important to understand thoroughly the object and right use of **alkalies** in the treatment of this disease. They are useful and necessary for

* Hemmeter: "Diseases of the Stomach," p. 449.

the purpose of neutralising the acids, such as acetic and butyric which result from the morbid fermentation of certain articles of food in the stomach, but they must not be given so as to neutralise the natural acid of the gastric juice. They are therefore best given at the end of the digestive process, and within a short distance of the next meal. At this time they answer other useful purposes; given in dilute solution warm, they dissolve and wash away, as we have already pointed out, the sticky morbid catarrhal mucus adhering to the gastric mucous membrane, and they also promote and stimulate the secretion of gastric juice for the approaching meal. But it is also not unfrequently necessary to give alkalies in many troublesome cases of chronic gastric catarrh, even during the digestive process, to relieve the suffering that is often caused by the rapid and excessive morbid development of acids in the stomach. We should, however, give them with caution and in not too large doses, and it is best then to combine an insoluble with a soluble alkali, for the former will only dissolve in an acid medium, and so soon as the offending acid is neutralised it will remain practically inert. A dose of 10 grains of sodium bicarbonate with 10 grains of *light* magnesia in an ounce of peppermint water is a good form for this purpose.

In anæmic cases, in which the gastric catarrh is due to an imperfect blood supply and defective secretion of gastric juice, it is often best to give a tonic containing iron and a few drops of dilute hydrochloric acid to restore the due proportion of acid in the gastric juice, soon after each meal. The following is a good form:—

℞ Ferri et quininæ citratis gr. v.
Liquoris strychninæ ♏iij.
Acidi hydrochlorici diluti ♏x.
Aquæ ad ℥j.
Misce, fiat haustus. To be taken after food three times a day.

In such cases it may also be necessary to give a dose of pepsin at or immediately after meals.

In advanced *atrophic* cases, in which from wasting of the gastric glands there is a great deficiency of digestive secretions, and sometimes an almost entire absence of hydrochloric acid and pepsin in the stomach, the indication is to administer full doses of this acid, with pepsin, after taking food. Ewald, who seems scarcely sufficiently to appreciate the value of alkalies in many cases of this disease, is, on the other hand, a vigorous advocate of the free use of hydrochloric acid. "It not only," he says, "replaces the deficient secretion of the glands, and forms the necessary acid albuminates for peptonisation, but it prevents organic fermentations, or limits those already existing." He gives it "in as concentrated watery solution as possible; that is, as acid as the patient's mouth will stand, three or four times, every quarter of an hour, after eating," and continues this treatment "for months without any bad effect." Pepsin he only gives "in advanced cases of mucous catarrh and atrophy of the stomach," and then in large doses, 7 to 15 grains dissolved in hydrochloric acid and water, about fifteen to twenty minutes after meals.* We regret we cannot fully share Prof. Ewald's views as to the great advantages to be realised from these large doses of hydrochloric acid.

In this country, at any rate (and it would appear to be so also in France, judging from the writings of French physicians), it is far more common to find the subjects of chronic gastric catarrh to be suffering from hyper-acidity.

In cases that are not being treated by purgative waters, the tendency to constipation must be corrected, and the bowels kept freely open by some suitable aperient. A pill of 1 to 3 grains of extract of aloes with half a grain or a grain of ipecacuanha powder, or 5 grains of the compound pill of colocynth and henbane, should be given at bed-time, and occasionally a grain of calomel or 2 grains of blue-

* "Lectures on Diseases of the Stomach," vol. ii., p. 38.

pill may advantageously be added. Some authorities think highly of the use of small doses of calomel in protracted cases of chronic gastric catarrh. "The one-fifth of a grain of calomel, combined with bismuth or bicarbonate of sodium, may be given for weeks without danger of salivation. Excellent results sometimes follow this treatment. In small doses calomel is undoubtedly sedative to the mucous membrane of the upper portions of the digestive tract." (Professor W. H. Welch.)

In cases that appear to have been brought on by chill, a Turkish bath may be useful, together with cold affusion and friction of the surface; a flannel belt worn round the abdomen has been found an excellent preventive, especially in malarious districts. The action of the skin should also be promoted by the habitual use of warm clothing.

Persons of indolent, sedentary habits should be encouraged to take adequate exercise in the open air as an essential part of the treatment; and, on the other hand, excessively energetic and restless patients should be made to understand that a due amount of rest is often an important curative agent when the body is feeble and ill-nourished.

Intragastric faradisation has been applied in some of these cases, and is commended by some American authorities on gastric diseases;* but we have never found it needful to recommend its application, although it might doubtless be of use in the neurotic forms, for these patients are never so happy as when they are being submitted to much elaborate manipulation.

Finally, we have to consider the **dietetic** management of these cases, which, it need scarcely be said, is of the first importance. It must be borne in mind that our first object is to give the stomach as much functional rest as possible, and we must therefore give the minimum amount of food consistent

* The method of applying this is described in Max Einhorn's "Diseases of the Stomach," p. 144.

with the due maintenance of the nutrition of the body, and we must give it in the most easily assimilable form. In very severe cases it may be desirable to give the stomach absolute rest for a time, and it may be necessary to support the patient for a few days exclusively by nutrient enemata, allowing only a little iced water by the mouth or iced Vichy water to allay thirst and neutralise acidity. Leube prefers the "pancreatic meat emulsion" for rectal feeding in such cases.*

Restriction to an *exclusively milk diet* has been strongly advocated in this malady, and it certainly proves of the greatest value in certain cases, allowing, as it does, a considerable amount of functional repose to the stomach, and moderating the acidity and irritating character of the gastric secretions, especially when we dilute the milk, as is often absolutely necessary, with an equal quantity of Vichy or Apollinaris water. We must, however, watch for individual idiosyncrasies with regard to this diet, as some patients digest milk with great difficulty. We must not give large quantities at a time; 3 ounces of milk with 3 ounces of an alkaline water every three hours will be enough at first. The constipation which is apt to attend such a diet should be corrected by a dose of Carlsbad salts—two or three teaspoonfuls in a tumblerful of hot water the first thing in the morning. We have rarely found this diet well supported unless the patient is, at the same time, kept absolutely *at rest.* *Buttermilk* in which the casein is already curdled and finely divided agrees with some persons better than fresh milk, and has been warmly advocated by some German physicians.

Carbohydrates, except in very small quantities, are generally best avoided in cases of stomach catarrh with hyper-acidity; they tend to undergo acetous and butyric fermentation, and often greatly increase the

* *See* the author's work on "Food in Health and Disease" (new edition), p. 545.

morbid acidity of the gastric contents. A little crumb of stale bread or a little thin dry toast usually agrees best.

All *fats* and fat sauces must be rigidly forbidden, as they tend to the formation of fatty acids in the stomach, and by rendering the food more or less impermeable to the gastric juice, retard digestion. It is often of use, as soon as the patient is thought able to take solid food, to give a teaspoonful of glycerine of pepsin or of Benger's liquor pepticus with each meat meal. Great regard should be paid to *individual* peculiarities. Niemeyer has pointed out that certain dyspeptics digest salt and smoked meats better than fresh ones, and accounts for this by the circumstance that those preserved meats are less readily decomposed than fresh meat.

The meals of these patients must be small in quantity, not bulky, and, as their digestive processes are often very slow, ample time must be allowed between the meals. The best and tenderest portions of the lean of meat, chicken, game, and the lightest kind of fish should be selected; and if the teeth are defective, and mastication, in consequence, imperfect, it is necessary to give these in a finely-divided form. Small quantities of fresh vegetables and potato may be permitted, in the form of purées.

With regard to beverages, it is advisable to forbid alcohol altogether, as well as strong tea or coffee. If a little wine seems to be needed, a light Bordeaux or Rhine wine of *good* quality mixed with Apollinaris water is the best. The plan of giving some alkaline water, warm, half an hour before food, such as Vichy, Vals, or Ems water, not only has the advantage of cleansing the mucous membrane of the stomach, as we have already explained, but it also tends to lessen the desire to drink while eating.

The following may be taken as a suitable diet in average cases at the commencement of treatment—admitting of modifications in accordance with the preceding general remarks:—

Breakfast, 8 A.M.—One or two poached or lightly boiled eggs; 2 oz. of thin toast; ½ oz. of butter; a cup of China tea (infused 3 minutes) with one-third milk.

11 A.M.—A cup of consommé or bovril or other meat juice.

1 to 1.30, *Lunch*.—3 oz. of tender lean of meat or chicken (not pork or veal); 2 oz. of mashed potato or purée of spinach; 1 oz. of thin dry toast; ½ oz. of butter.

4 to 5 P.M.—A cup of China tea, as at breakfast; one or two slices of thin (stale) bread and butter.

7 P.M.—A grilled or boiled sole or whiting, about 4 oz.; or a grilled mutton cutlet (free from fat), about 3 oz.; or breast or wing of chicken or pheasant, with 2 oz. of boiled rice, and water-cress or mustard-and-cress.

A tablespoonful of brandy (good quality) with 4 oz. of water may be taken at lunch and at dinner.

(This diet will, of course, need increasing as gastric tone is restored.)

ADDITIONAL FORMULÆ.

In acute gastric catarrh in infants with nausea and vomiting.

℞ Acidi tartarici, gr. xv.
Aquæ laurocerasi, ♏ x ad xx.
Syrupi mori, ʒij.
Aquæ destillatæ ad ℥v.
M. f. mist. A dessertspoonful every two hours. (*Prof. Monti.*)

If with fever.

℞ Acidi hydrochlorici diluti, ♏ v ad x.
Syrupi simplicis, ʒij.
Aquæ destillatæ ad ℥iij.
M. f. mist. A dessertspoonful every two hours. (*Monti.*)

When gastric irritability has disappeared, but feverishness continues.

℞ Quininæ hydrochloridi, gr. v.
Acidi hydrochlorici diluti, ♏ v.
Syrupi simplicis, ℥jss.
Aquæ destillatæ ad ℥iij.
M. f. mist. A teaspoonful every two hours. (*Monti.*)

Powders for chronic gastritis.

℞ Bismuthi subnitratis, ʒxii.
Bismuthi subgallatis, ʒiv.
M. et divide in pulv. xxiv. One powder in a wafer four times daily. (*Hemmeter.*)

For chronic gastric catarrh with pyrosis.

℞ Bismuthi subnitratis, gr. lxxx.
Morphinæ hydrochloridi, gr. ⅔.
Sodii bicarbonatis, gr. xxx.
M. et divide in pulv. x. A powder to be taken every two hours. (*Bamberger.*)

Do. with loss of appetite.

℞ Extracti gentianæ, gr. xxx.
Syrupi aurantii corticis, ʒv.
Aquæ destillatæ ad ℥vj.
M. f. mist. A tablespoonful before each meal. (*Bamberger.*)

Or

℞ Tincturæ nucis vomicæ, ♏ lxxv.
Aquæ laurocerasi, ʒijss.
Tincturæ quassiæ ad ℥j.
M. f. mist. Fifteen drops to be taken, in water, three times a day. (*Bamberger.*)

For acute gastric catarrh.

℞ Acidi carbolici, gr. ½.
Bismuthi subnitratis, gr. x.
Mucilaginis acaciæ, ʒss.
Aquæ menthæ piperitæ ad ʒij.

M. To be taken in a tablespoonful of water every one, two, or three hours.
(*D. D. Stewart.*)

Sedative mixture in acute gastric catarrh.

℞ Bismuthi carbonatis, ʒv.
Acidi hydrocyanici diluti, ʒj.
Liquoris morphinæ hydrochloridi, ʒij.
Mucilaginis acaciæ, ʒjss.
Aquæ chloroformi ad ʒiv.

M. f. mist. A teaspoonful four times a day before food.
(*Whitla.*)

For chronic gastric catarrh in children.

℞ Sodii bicarbonatis, ʒj.
Creasoti puri, guttæ iv.
Pulveris acaciæ, q.s.
Glycerini, ʒij.
Olei cinnamomi, guttæ iv.
Aquæ puræ q.s. ad ʒiij.

M. f. mist. For a child of six, a small teaspoonful in a little water, soon after meals.
(*Prof. Pepper.*)

For anorexia in chronic gastritis.

℞ Strychninæ sulphatis, g. ½.
Acidi hydrochlorici diluti, ʒv.
Elixir gentianæ, ad ʒ vj.

M. f. mist. A tablespoonful in a wineglass of water, after meals. (*Hemmeter.*)

In acute gastric catarrh in children.

℞ Bismuthi carbonatis } āā gr.
Sodii bicarbonatis } ij.
Pulveris rhei, gr. ss.
Pulveris aromatici, gr. j.

M. f. pulv. To be taken before each meal.

For chronic gastric catarrh.

℞ Argenti nitratis, gr. vj.
Bismuthi subnitratis, gr. xxx.
Extracti hyoscyami, gr. xl.

M. et divide in pil. xl. One morning and evening. (*Millet.*)

CHAPTER IV.

DISEASES OF THE STOMACH—TREATMENT OF ULCER OF THE STOMACH AND OF CANCER OF THE STOMACH.

ULCER OF THE STOMACH.—Characters—Causation of, obscure—Symptoms and Course — Pain —Vomiting — Hæmorrhage—Indications for Treatment—Washing out the Stomach—Alimentation—The "Rest" Cure—Drugs, etc.—Transfusion —Treatment of Perforation—Gastro-enterostomy—After-treatment. CANCER OF THE STOMACH.—Situation—Diagnosis —Symptoms — Indications for Treatment — Diet — Washing out the Stomach—Anti-fermentive and Antiseptic Remedies, etc. — Condurango — Operative (Surgical) Treatment — Additional Formulæ.

ULCER OF THE STOMACH.

THE disease the treatment of which we are now about to consider has been variously named "simple," "round," "perforating," and "chronic" ulcer of the stomach.*

The ulcer is usually single, occasionally multiple; it varies in size from that of a sixpence to that of a crown piece; the smaller ones are circular, the larger elliptical, and those formed by the coalescence of two or more are of irregular outline. Its edges are usually clean cut, and it has the appearance of being punched out; the edges, however, become indurated and thickened in the more chronic form. As it penetrates the different coats of the stomach it does so to an unequal extent, so that it has a funnel-shaped or shelving aspect; and when it leads to *perforation* of all the coats, as it is prone to do, the peritoneal opening is smaller than the gastric. It tends to be located especially on the posterior surface, along the lesser curvature and at the pyloric end of the stomach. Its healing is attended by cicatrisation and puckering of the adjacent mucous membrane, and when this occurs extensively in connection with large or multiple

* Fenwick, in contradistinction to other authors, insists on distinguishing "two distinct forms," viz. "acute" gastric ulcer and "chronic" gastric ulcer. *Vide* "Ulcer of Stomach and Duodenum," p. 131.

ulcers extending transversely from the lesser curvature, it may cause hour-glass contraction by drawing up the greater curvature towards the lesser; or if situated near the pylorus, it may produce pyloric stenosis and consequent dilatation of the stomach.

The chief dangers attending this form of gastric ulcer are perforation and hæmorrhage. If the ulcer perforates all the coats of the stomach before inflammatory adhesion has taken place between it and one or other of the adjacent organs, peritonitis, often fatal, is rapidly set up; if one of the larger blood-vessels becomes eroded, a large and fatal hæmorrhage may result; smaller hæmorrhages are of common occurrence, as we shall see, in the course of the chronic forms of this disease. Owing to the greater mobility of the anterior wall and greater curvature, ulcers in these situations are attended with greater danger of perforation. Relapses are frequent even after cicatrisation, as the cicatricial tissue, it must be remembered, is of low organisation.

Very little is known with certainty as to the **etiology** of this affection, and very little help therefore in framing indications for treatment can be derived from etiological considerations.

It is certainly more common in women than in men, and anæmic, chlorotic, and debilitated conditions seem to predispose to its occurrence. It is said that in women the tendency to perforation is especially marked about the age of twenty. Gastric ulcer has been observed to be "most frequent in the class of maid-servants between the age of eighteen and that of twenty-five" (Budd), and also to be of frequent occurrence in cooks, who have to taste *hot* things, and in tipplers. The general conclusion arrived at is that some local affection of the vessels of the mucous membrane at the seat of ulceration is attended by thrombosis and obliteration of the vessels of a small vascular area, with consequent necrosis of the corresponding mucous surface—that this is attacked and dissolved by the gastric juice, and perhaps a condition

of *hyperacidity* of this secretion may determine the solution of the subjacent tissues and the rapid formation or deepening of the ulcer. Bacterial agency is believed by some to be an important factor. However, as already stated, the etiology of simple gastric ulcer is admittedly obscure. It is, however, a well-established fact that chlorosis in young women predisposes to gastric ulcer.

The **symptoms** of this affection must next be examined in detail. The three most important are—(*a*) pain; (*b*) vomiting; (*c*) hæmorrhage.

(*a*) The *pain* of gastric ulcer usually comes on directly after taking food, but it may be delayed for half an hour or longer. It is commonly localised in a circumscribed spot in the epigastrium. Paroxysms of more diffused pain are also common, spreading over the whole epigastric region and extending through to the lower dorsal or interscapular region. Coarse, indigestible, hot, and pungent foods are especially prone to excite this pain. It usually continues as long as food remains in the stomach, and is relieved when the contents of the stomach are discharged by vomiting. The pain is generally increased by pressure, and there is almost always some tenderness on pressure over a circumscribed spot in the epigastrium even when the stomach is empty. When the tenderness on pressure is exceedingly severe, it is regarded as a sign of the occurrence of peritonitis around the seat of the ulcer. The pain of gastric ulcer is sometimes radiated to more distant nerves—the lower intercostal, other branches of the vagus, etc.—and pains may arise from cicatricial adhesions to other organs and the involvement of nerve fibres in these cicatrices, and it must be borne in mind that *such pains may continue after the healing of the ulcer.*

The pain following the taking of food is regarded as caused by the movements then excited in the stomach irritating the surface of the ulcer, and this is further aggravated by contact with the acid gastric juice secreted on the introduction of food. There is

often a complaint of more or less continuous dull aching pain in the epigastric region in the intervals of digestion. It is important to bear in mind that in some latent and obscure cases severe pain is wholly absent, and fatal perforation or serious hæmorrhage may occur suddenly and unexpectedly, the only preceding symptom being a little uneasiness during digestion.

(*b*) *Vomiting* is rarely absent in cases of gastric ulcer. It usually occurs, as the pain does, shortly after taking food; it is ordinarily preceded and accompanied by pain, which the vomiting, when complete, relieves. The vomited matters consist of food more or less changed, mixed with mucus and acid secretions in which sarcinæ may often be found. An abnormal amount of hydrochloric acid is often present, as well as lactic acid, in the matters vomited; and Max Einhorn* states that the acidity may reach as much as three or four times that of normal gastric juice. It has been noticed that the vomit in gastric ulcer rarely contains bile. The vomiting is provoked by irritation of the nerve-fibres in the ulcerated surface and by the frequent co-existence of gastric catarrh, and it is especially excited by improper and irritating food. Its effect is to exhaust the patient by the continuous withdrawal of nourishment, unless it be checked by treatment.

(*c*) *Hæmorrhage.* — Probably in all cases of gastric ulcer some bleeding takes place into the stomach from the surface of the ulcer, but a small hæmorrhage into the stomach need not lead to vomiting; it would, however, probably reveal itself in an altered colour of the stools if these were watched. But when there is frequent vomiting in cases of gastric ulcer, the vomited matters usually at some time or other contain blood. The vomit is often of a dirty brown colour, due to the action of the gastric juice on the hæmoglobin. It has been

* "Diseases of the Stomach" (second edition), p. 211.

estimated that a considerable hæmorrhage occurs in about one-third of the cases; some authorities (Lebert) consider that it occurs in a far greater proportion. It is absent, as a rule, in the acute perforating cases.

The hæmorrhage may vary considerably in amount, from a little oozing just sufficient to discolour the vomit to large gushes of blood seriously imperilling the life of the patient, and sometimes sufficient at once to cause fatal syncope. The occurrence of profuse hæmorrhage shows that the ulceration has extended deep enough to reach and erode the larger vessels. In such cases the blood vomited is often pure and of a bright colour, not having remained long enough in the stomach to be altered by contact with the gastric juice. All the blood that thus escapes is not, of course, vomited, but much passes away through the intestinal canal, giving rise to what are termed "tarry" stools; and in rapidly fatal cases there may be no escape of blood by the mouth, as it may immediately over-distend the stomach and remain there. The non-fatal hæmorrhages tend to recur frequently, as the movements of the stomach—and especially those induced by the ingestion of food—lead to the re-opening of the bleeding vessels. These repeated losses of blood either induce a profound anæmia or lead ultimately to death by exhaustion.

In addition to these three prominent symptoms, most sufferers from gastric ulcer present the more common symptoms of the dyspeptic state, as a condition of chronic gastric catarrh often accompanies ulceration of the stomach. Cases, however, occur in which no symptoms of dyspepsia are complained of. But usually there are loss of appetite, heartburn, and acid* eructations, nausea, a sense of weight

* Ewald, Reigel, Hemmeter, and others state that the gastric juice withdrawn from the stomach in cases of simple ulcer is, almost always, more *acid* than in health; but Fenwick remarks that "while hyperacidity is an important cause of the *chronicity* of an ulcer, the *disease itself is usually the cause and not the consequence of the hypersecretion*, since any form of local irritation in the stomach is sufficient to induce a reflex secretion of the gastric juice" ("Ulcer of Stomach," p. 90).

and oppression in the epigastrium, thirst, bad taste in the mouth, and the usual symptoms of chronic gastric catarrh. In advanced cases, owing to impairment of the movements of the stomach by adhesion to other organs, or by contraction of parts owing to extensive cicatrisations, dilatation of the stomach may be developed with retention and decomposition of food.

Constipation is a usual accompaniment of gastric ulcer; this is chiefly due to the small amount of food digested, the greater part being rejected by vomiting. Dreschfeld has noted the occurrence of acetonuria in certain cases of gastric ulcer.*

A condition of general debility with great depression of spirits is usually induced by chronic ulcer of the stomach, but we meet with exceptional cases in young women who remain fairly plump and well-nourished.

Amenorrhœa is a symptom also commonly met with in this disease.

It has been calculated that *perforation* into the general peritoneal cavity occurs in about 7 per cent. of all cases of ulcer of the stomach;† it occurs twice or three times more frequently in the female than the male, and in the former especially between the ages of fourteen and thirty. It is important to bear in mind, from the point of view of treatment, that the immediate cause of perforation of gastric ulcer is often the existence of some condition producing tension of the stomach walls, such as distension with food or gas, retching and vomiting, straining at stool, coughing, sneezing, violent exertion or sudden movement of the body, and mechanical pressure on the epigastrium. Perforation of a gastric ulcer is reported to have occurred from kneading the abdomen to relieve flatulence in a patient in a hydropathic establishment,‡

* Article on "Ulcer of Stomach." Allbutt's "System of Medicine," vol. iii., p. 533.

† Fenwick, "Ulcer of the Stomach and Duodenum," p. 200.

‡ Dalton, *Transactions* of the New York Pathological Society, vol. i., p. 263.

from the passage of a bougie (Fenwick), and from the performance of lavage (Ewald).

The symptoms of perforation are—first, severe and agonising pain in the epigastrium, which spreads all over the abdomen. This is accompanied with symptoms of collapse, a small, quick, thready pulse; face pale and pinched; skin covered with cold, clammy perspiration; voice feeble, respirations shallow, quickened and thoracic. The temperature is at first subnormal, but rises if the patient survives for a time and peritonitis ensues. The tongue gets dry, there is thirst and often much retching, although no vomiting. There is marked constipation. The secretion of urine is diminished and may be suppressed.

The abdomen is usually distended and tympanitic and the liver dulness is absent or much diminished. If the patient does not die at once from collapse, the temperature rises to 102° or 103° from peritonitis, the pulse gets harder, respiration more shallow, hiccough occurs, and death commonly follows from exhaustion.

Gastric ulcer in the majority of cases is completely curable; it must, however, be remembered that cicatrisation of an extensive ulcerated surface of the gastric mucous membrane and subsequent contraction of this cicatrix, or adhesions between the stomach and surrounding organs, may lead to troublesome symptoms later on, such as gastralgia, vomiting, and other symptoms of dyspepsia; or contraction of the pyloric end of the stomach may cause dilatation and its consequences, as has already been pointed out.

The *great and paramount indication* in the **treatment** of gastric ulcer is to promote healing and cicatrisation of the ulcerated surface. This will be best effected by such means as will remove all sources of irritation and secure the greatest amount of **rest,** mechanical and functional, to the stomach; the avoidance of irritating movements being an important condition of the healing process. The patient must, therefore, for a time at any rate, be kept

at rest in bed, and the stomach must be kept as empty as possible, since the presence of food excites movements in it. By keeping the stomach empty we also avoid the irritating contact of food and gastric juice with the ulcerated surface; and the gastric mucous membrane being thrown into folds, in the contracted state of the stomach, the extent of the ulcerated surface is thereby diminished and its healing promoted.

An *appropriate method of feeding* is, then, the most important part of the treatment of such cases. Medicinal remedies may also be of value (*a*) by producing a protective covering to the ulcerated surface, and so preventing the contact of irritating substances with it; (*b*) by *arresting hæmorrhage;* and (*c*) by *relieving pain.*

As to the practice of *washing out the stomach*, which has been advocated by some physicians, in this disease, we agree with Sée, Leube, and Ewald that it is not unattended with danger of severe and fatal hæmorrhage, and that it is not to be commended. It is also inconsistent with the idea of keeping the stomach at rest. In certain *very* chronic cases, accompanied with chronic catarrh and dilatation of the stomach, and the protracted retention and decomposition of food in that organ, cautious and careful washing out, using a soft rubber tube and adopting the syphon process, may possibly be useful. But when there is any risk of exciting hæmorrhage, this method must be strictly avoided.

As to the mode of alimentation best calculated to promote mechanical and functional **rest** of the stomach, and so contribute to the speedy healing of the ulcerated mucous membrane, we have elsewhere formulated rules for this purpose* which may be thus summarised.

In all cases of gastric ulcer, and more especially where severe and dangerous hæmorrhages have occurred and may recur, it is necessary to keep the

* "Food in Health and Disease" (new edition), p. 377.

stomach absolutely at rest and empty. For five or six days at least the patient should be fed exclusively with nutrient enemata.* To allay thirst a few fragments of ice may be sucked, and enemata of normal saline solution have been given (Ewald) to relieve intolerable thirst. As we have already pointed out, complete rest in bed must be enforced.

After five or six days of rectal feeding, some *fluid* food, in small quantities at a time (not more than 1 or 2 ounces), may be given by the mouth every three or four hours. When *all* immediate risk of further hæmorrhage appears to have ceased, feeding by the stomach may be carried out on the following principles:—(*a*) All food that can either mechanically or chemically irritate the surface of the ulcer must be avoided. (*b*) Food that is calculated to stimulate the acid secretions of the stomach must be forbidden, as these act as irritants to the ulcerated surface; therefore predigested foods, or foods that will pass through the stomach and be digested in the small intestine, are indicated. (*c*) We must be especially careful to avoid *distending* the stomach by giving any great quantity of food at a time, for, as we have already said, by maintaining the stomach in a contracted condition its mucous membrane is thrown into folds, the margins of the ulcer are relaxed, and its superficial extent thereby diminished—circumstances which favour the filling up and cicatrisation of the ulcer. The quantity of fluid or semi-fluid food should therefore be limited to between 2 and 4 ounces at a time. As a rule, restriction to an *exclusively milk diet* will fulfil these indications. It is essential, however, that we should obviate the possible danger of the formation of a considerable mass of milk curd in the stomach by taking measures to prevent any firm coagulation of the casein of milk in that organ. The milk should in all cases be *diluted* with an alkaline water, and pure undiluted milk should never be given except in convalescent cases and in persons

* Formulæ for suitable enemata will be found at p. 37.

who have been found to digest milk with facility. The milk may be diluted with an equal quantity of lime water or Vichy water, or to each cup of milk and water a powder may be added composed of

Bicarbonate of soda	...	...	...	10 grains.
Light magnesia	...	...	...	5 „

Four ounces of milk and water thus treated may be given every two or three hours. If we desire to give the patient more concentrated or more supporting food, an egg may be beaten up with two tablespoonfuls of boiling water, and then strained through muslin, and to this 2 ounces of milk and water may be added; or about 1 ounce of the crumb of a stale roll, well soaked previously in hot water and rubbed through a sieve, may be mixed with 3 ounces of milk and water, and given twice or three times a day. It is especially important also not to give food too frequently, even fluid food, lest it should accumulate in and over-distend the stomach.

In cases where we encounter a distinct intolerance of a milk diet, small quantities of meat or chicken may be given, reduced to a pulp (the lean only), mixed with a little weak broth or *consommé*.*

Leube's soluble meat is much used in Germany in cases like these. This preparation is usually mixed with slightly salted broth and taken lukewarm; some milk and some well-soaked bread may be added.

Dreschfeld speaks highly of scraped raw beef as well borne, if given in small quantities. He gives it "early in the course of the case."†

All wine and spirits should be forbidden. A little weak tea with milk may be permitted, but not more than three-fourths of a small teacupful at a time. If

* The lean of meat (raw) passed twice through an American mincer, and then cooked for twelve minutes in a *bain marie* with a little water, will be found a useful food in these and many other circumstances. One or two teaspoonfuls of the meat may be mixed with a tablespoonful or two of clear soup.

† Article on "Ulcer of Stomach" in Allbutt's "System of Medicine," vol. iii., p. 543.

oatmeal gruel is given (and it may be advantageously mixed with milk) it should be prepared with finely-powdered oatmeal, and not with coarse groats, the rough particles of which are apt, by their contact, to set up irritation of the ulcerated surface. Peptonised foods, especially milk and gruel, are distinctly valuable.

Rest in bed, we repeat, is a most important condition in the graver cases, as it not only avoids movement of the injured organ, but it lessens the nutritive wants of the system as much as possible. In less serious or in convalescent cases, although a certain limited amount of gentle exercise may be permitted, the advisability of physical rest must still be kept in mind.

When there is reason to believe that cicatrisation has been established, a cautious and gradual return to ordinary diet may be permitted, care being observed that the food is of a kind easy of digestion.

In chronic cases, associated with much chronic catarrh of the stomach, the advantage of clearing out and cleansing the stomach and alimentary canal by repeated draughts of Carlsbad water or a solution of Carlsbad salts* in hot water has been urged by many authorities. The sodium sulphate in these salts, by stimulating peristaltic action, promotes the expulsion of the contents of the stomach into the small intestine; the sodium bicarbonate dissolves stringy and tenacious mucus, and also aids in its detachment and expulsion from the stomach, while it acts also usefully as an antacid; the sodium chloride is a stimulant to digestion and an antiseptic. The object in view is the same as that aimed at by *lavage*, the danger of which it avoids, viz. the regular removal of the decomposing and irritating stomach contents from contact with the ulcerated mucous membrane.

* Artificial Carlsbad salts are best made by combining sodium sulphate, sodium bicarbonate, and sodium chloride, in the proportion of 8 oz. of the first, an ounce of the second, and ½ oz. of the third.

The following is the best way of carrying out this treatment :—A teaspoonful of the Carlsbad salts is dissolved in 6 oz. of warm water (about 100° to 120° F.), and four such doses are taken at intervals of ten or fifteen minutes, in the morning, fasting. Breakfast must not be taken until half an hour after the last dose. After breakfast the patient usually has two or three loose actions of the bowels. If the bowels are too freely acted upon, a somewhat smaller quantity of the salts should be added to each glass of water ; and if not sufficiently relieved, the quantity of the salts, but not of the water, must be augmented.

The "rest cure" adopted by some German physicians in the treatment of gastric ulcer differs little from the foregoing. It requires the patient to remain in bed for two or three weeks, during which time warm linseed poultices are applied to the epigastrium. If there has been much pain or vomiting, feeding by the rectum is practised for two or three days, and only a few fragments of ice are taken by the mouth. For the first fortnight the diet is restricted to milk absolutely, diluted usually with barley or oatmeal water. The milk is slightly warmed and slowly sipped, about 3 oz. being given every hour. In the third week bread and milk, milk puddings, and poached eggs are permitted, the patient being fed at intervals of two hours. In the fourth week some pounded raw or slightly grilled meat is given once or twice a day. If the patient's progress is satisfactory a gradual return to a solid dietary, composed chiefly of white fish, game, sweetbreads, potatoes, and broths, is permitted. Some authorities consider that strict dietetic treatment should be maintained for a year or eighteen months, especially in long-standing chronic cases; in that case, for from three to six months' milk must form the staple diet, but after the second month some solids may be added, as bread and milk, lightly boiled eggs, scraped or pounded raw meat, etc., and between the sixth and twelfth or eighteenth month a gradual return to ordinary diet may be permitted by

the progressive introduction of the more easily digested kinds of fish, game, poultry, etc.

In the next place we will consider the value of certain medicines which have been employed—(*a*) for their local cicatrising action on the ulcer itself; (*b*) for the relief of pain and vomiting; and (*c*) for the arrest of hæmorrhage.

It has been maintained, and we think justly, that the administration of **alkaline carbonates,** by neutralising the hyperacidity and so lessening the irritation of the gastric secretions, assists in promoting healing of the ulcerated surface, and that they promote the passage of the food into, and its digestion in, the small intestine. The objections put forth by some physicians, on physiological grounds, that the administration of alkalies provokes the secretion of *acid* gastric juice, is really not applicable to those *morbid* states in which the gastric secretions are already excessively acid from undue retention and fermentation. To urge such objections betrays a want of discrimination and of *practical* experience. Physiological observations are applicable to normal physiological conditions, and before they are applied to morbid, pathological states, they must be corrected by practical clinical experience; and the latter affords abundance of evidence of the value of alkalies administered at suitable times in such cases. Niemeyer, who was an admirable clinical observer, says, "The therapeutic use of the alkaline carbonates has a wonderful effect in chronic ulcer of the stomach." *

A combination of sodium bicarbonate, magnesium carbonate, and bismuth carbonate or sub-nitrate, is one of the most efficacious prescriptions (together with a milk diet) in the treatment of *average* cases of chronic gastric ulcer as we meet with them in hospital practice. The magnesium carbonate, being an insoluble substance except in the presence of an acid, will continue to neutralise or diminish the

* "Text-book of Practical Medicine," vol. i., p. 513

gastric acidity so long as any of it remains undissolved. And we think there can be little doubt that when the stomach is empty and contracted, and the patient lying recumbent in bed, the mixture of bismuth and magnesia must form more or less of a protective covering to the ulcer, and so favour the healing process. The following is a suitable formula for these cases:—

℞ Bismuthi carbonatis gr. xx.
Magnesii carbonatis gr. x.
Sodii bicarbonatis gr. v.
Aquæ ad ʒj.

Misce, fiat haustus. To be taken ½ an hour before food, three times a day.

Much larger doses of bismuth than this are given by French and German physicians. Rosenheim gives as much as 150 grains for a dose, in the morning fasting, mixed with 6 ounces of water. Ewald also approves of these large doses. Fleiner has also adopted a successful method of treating gastric ulcer with large doses of bismuth, but he resorts to the use of the stomach tube, through which the bismuth salt, suspended in water, is poured into the stomach. We think the use of this tube objectionable and needless, and prefer a modification of his method such as the following: Let the patient, in the early morning, drink slowly about 12 ounces of warm water containing, in solution, 60 grains of sodium bicarbonate and 20 grains of sodium chloride to wash the mucous membrane; about half an hour afterwards let the patient take a mixture of 200 grains of bismuth carbonate shaken up with 6 ounces of warm water. The patient should remain in bed, and if there is any reason to believe that the ulcer is on the anterior wall of the stomach he should lie on his face. This may be given daily for a fortnight or three weeks.

In more troublesome chronic cases we have found **nitrate of silver** of considerable value. We believe that suitably administered it forms a protective

covering to the ulcerated surface and promotes healing, but much, no doubt, depends on the situation of the ulcer; it is quite conceivable that an ulcer on the posterior wall of the stomach would be much more amenable to such action than one on the anterior surface, and it would be necessary also that the stomach should be as nearly as possible empty at the time of its administration. The following pill may be given three or four times a day about half an hour before giving food:—

Argenti nitratis gr. ½.
Unguentum kaolin, quantum sufficiat.
Ut fiat pilula.

Max Einhorn * prefers giving the argentic nitrate in solution in distilled water, from ⅓ to ½ a grain dissolved in a wine-glass of distilled water half an hour before meals three times a day. As the ulcer is more commonly situated at the pyloric end of the stomach, it has been suggested that the patient should lie on his right side after taking such a dose.

The antiseptic action of both bismuth and nitrate of silver may have something to do with their beneficial effects in these cases.

Some physicians† have advocated the use of the tincture of perchloride of iron as a remedy which promotes a healthy, healing action in the ulcerated surface and allays pain. It certainly seems likely to be useful in certain low cachectic or anæmic cases. It may be given in 5-minim doses in two tablespoonfuls of water several times a day. In cases where aperients cannot be given by the mouth it is desirable to wash out the bowel daily with a copious enema of tepid water.

Of the various remedies used for the relief of pain and vomiting, in addition to those incidentally mentioned, we have opium, chloroform water, hydrocyanic acid, cocaine, creasote, ice, applied externally

* "Diseases of the Stomach" (second edition), p. 230.
† Gerhardt and Luton.

and internally, hot fomentations, and counter-irritation.

Few cases of chronic ulcer of the stomach can be satisfactorily treated without the occasional use of **opium**, especially for the purpose of calming those severe attacks of pain and vomiting which commonly occur during the course of the disease. Brinton maintained that over and above its influence in relieving pain, opium was *essential* to the cure of gastric ulcer; we are unable to share this view, as we have repeatedly seen rapid recoveries from gastric ulcer without the administration of a single dose of opium.

A pill of the extract of opium ($\frac{1}{2}$ grain or a grain) may be given two or three times in the twenty-four hours until the pain is relieved; or 5 to 15 minims of the liquor opii sedativus, according to the severity of the pain, may be added to each dose of the bismuth and magnesia mixture, already mentioned; or it may be given combined with a tablespoonful of lime water; or if there is great irritability and intolerance on the part of the stomach, a hypodermic injection of $\frac{1}{8}$ to $\frac{1}{4}$ of a grain of hydrochloride of morphine may be given; or small doses of morphine ($\frac{1}{12}$ to $\frac{1}{6}$ grain), combined with dilute hydrocyanic acid 3 to 5 minims, in a tablespoonful of water, may be given by the mouth every three or four hours with good effect.

As an alternative to the employment of opiates when any objection exists to their use, cocaine may be given. It produces anæsthesia of the gastric mucous membrane, and so allays pain and lessens the sensation of hunger. A tablespoonful of the following may be given from time to time:—

℞ Cocainæ hydrochloridi gr. ij.
Aquæ laurocerasi ʒvj.
Aquæ ad ʒiij.
Misce, fiat mistura.

Creasote shaken up with water in the proportion of 1 minim to 2 ounces, and given in doses of one

tablespoonful every two or three hours, has been found to relieve both pain and vomiting in some troublesome chronic cases; its antiseptic and antifermentive action may here be of value.

The internal and external use of ice has been found of service in allaying gastric irritability and relieving pain. Leeches to the epigastrium, hot poultices and blisters, have their respective advocates. Leube and Ziemmsen employ warm linseed poultices by day and a cold compress at night. In obstinate cases of fixed pain referred to the epigastric region, a small blister applied to the painful spot may be of benefit, and the raw surface may be dressed with morphine.

In hæmorrhagic cases the strict dietetic method already outlined must be rigidly applied, and all food for a time must be given by the bowel. Small fragments of ice should be sucked or swallowed, a bladder of ice applied to the epigastrium, and mustard plasters to the feet as derivatives. The hypodermic injection of ergotine, perchloride of iron in 20 minim doses with an ounce of iced water by the mouth, and such other measures as are referred to in the chapter on *hæmatemesis* may be employed. The most complete physical rest must, of course, be enforced.

Transfusion, in cases of alarming hæmorrhage, with symptoms of collapse, is rarely adopted now, as a subcutaneous injection of a physiological salt solution has taken its place—4 to 6 parts of sodium chloride to 1,000 parts of distilled water—twenty to thirty ounces of this solution, warmed to the blood temperature, may be injected into the connective tissue under the skin, in the flank.

Although **perforation** of the stomach as a consequence of gastric ulcer is often speedily fatal, recoveries are now more frequent since the adoption of operative measures has become more common. If, for any reason, operation cannot be had recourse to, the patient should be brought quickly under the influence of opium—preferably by hypodermic

injections of morphine or by opiate enemata, as it is undesirable to allow anything to pass by the mouth into the stomach. Twenty drops of tincture of opium in 2 ounces of thin starch mucilage may be injected every hour into the rectum, or $\frac{1}{3}$ grain of hydrochloride of morphine may be given hypodermically every hour for three or four doses. Ice-cold compresses to the abdominal surface are useful in allaying peritonitis; some, however, prefer warm fomentations, to which some tincture of opium may be added. The free use of opium will, at any rate, relieve the sufferings of the patient, if it does nothing more.

Thirst may be relieved by sucking small pieces of ice, or warm water may be injected into the rectum, and if stimulants are needed they must also be given in enemata or injected hypodermically.

In order to prevent the further escape of the stomach contents through the perforation, Schliep has resorted to the cautious use of the stomach tube with success.

We must now refer briefly to the **surgical** measures which have been proposed in connection with the treatment of gastric ulcer, especially in connection with hæmorrhage and perforation. Mayo Robson * and Moynihan state that, according to their latest statistics, the mortality of gastric ulcer treated surgically is only 5 per cent., which they contrast with 25 per cent. of deaths in cases treated medically. Mayo Robson thinks that "medical should give place to surgical treatment at a much earlier period than has hitherto been the custom," but he is by no means in favour of a "sweeping change" in this direction, but that the medical treatment should be "more rigid and more prolonged." He considers "in all cases of gastric ulcer, except in cases of perforation, medical treatment should be first tried." But when the symptoms of ulceration recur and prove intract-

* "Diseases of the Stomach and their Surgical Treatment" (1901).

able to medical treatment, *gastro-enterostomy* should be performed. This operation secures "physiological rest by means of drainage, thus allowing the ulcer to heal without being subjected to the irritation of acid secretion, accumulation of food, or frequent stomach movement." It also remedies "the hyperchlorhydria, relieves pyloric spasms, and, while preventing the stagnation of fluids, cures or materially diminishes gastric dilatation."

If the operation has been undertaken for the relief of obstinate and serious hæmorrhage, and if an ulcer be discovered, it should, if possible, be excised, as that operation offers the likeliest method of cure. But except for the cure of hæmorrhage, direct treatment of the ulcer by excision is unnecessary.

It is in *chronic* cases that the best results are obtained from operation, but in cases of *acute* hæmorrhage Mayo Robson thinks it best to rely upon medical treatment, which has been found to succeed in 93 per cent. of cases, as operative treatment in these cases is attended by a very high rate of mortality. Surgical treatment may also be needed in dealing with such complications as adhesions, pyloric contractions, dilatations and hour glass contractions, leading to loss of flesh and impairment of health.

It is especially in cases of *repeated* chronic hæmorrhages that operation should be resorted to. For operative details we must refer to the work already quoted.

The results of surgical treatment of *perforation* are now much more favourable than they were formerly, a circumstance doubtless greatly due to the fact that operative measures are adopted much earlier than they used to be. Robson and Moynihan* estimate the mortality after operation for perforation at 40 to 50 per cent.—although in the first 100 cases operated on the mortality was between 70 and 80 per cent. The death-rate in cases of perforation treated

* "Diseases of the Stomach and their Surgical Treatment" (1901), p. 162.

without surgical operation has been estimated, by all authorities, as over 95 per cent. Operation ought therefore to be undertaken as soon as the diagnosis of perforation is made. For details as to the method of operating we must refer to surgical treatises, but we may say generally that it is usual to adopt every precaution against shock—an injection of strychnine is given—the operating table is heated, and the patient's limbs are enveloped in cotton-wool. The abdomen is opened by a free incision in the middle line above the umbilicus and the perforation in the walls of the stomach rapidly and carefully searched for, and when found it is sutured. Excision of the ulcer is not necessary or usual unless it makes suturing easier. After the ulcer has been closed the peritoneal cavity is thoroughly and methodically cleansed.

The **after-treatment** of cases of cured gastric ulcer must be conducted on general principles. The anæmia must be treated with mild preparations of iron, the dyspepsia by careful and cautious feeding; the frequent co-existence of constipation should be treated by enemata of salt and water (a teaspoonful to a pint of water), or by a dose of Carlsbad salts in the morning fasting in the manner already indicated. Leube recommends a course of the Franzensbad or Elster waters on account of the iron they contain, in addition to aperient sulphates, and in recent cases Gerhardt and Bamberger strongly recommend the course at Carlsbad.

If persistent cardialgia and dyspepsia are found to follow the cicatrisation of gastric ulcer, it is probable either that the cicatrisation has led to the compression of some filaments of the gastric nerves, or that adhesions to adjacent organs have formed, producing painful dragging or tension during the movements of the stomach in the processes of digestion. Extensive cicatrisation near the pyloric end of the stomach may lead to stricture and subsequent dilatation of the stomach, the appropriate treatment of which conditions will be considered hereafter.

Especial care must be taken of the patient during the menstrual period, as it is generally recognised that menstruation has a tendency to influence a recurrence of hæmorrhage.

Finally, when we are in doubt whether a case is one of gastric ulcer or not, it is best, especially if we have to do with a young or chlorotic girl, to treat the case as if it were one of ulceration, for it is precisely in this class of patient that perforating ulcer of the stomach is apt to run a latent course and to end suddenly in perforation or be attended with sudden and profuse hæmatemesis; and even if the case should not be one of ulceration, but simply one of functional disease, the strict dietetic treatment appropriate to the former condition cannot do harm in the latter, but rather good—indeed, it may serve as a prophylactic measure, especially if followed by suitable tonic treatment.

CANCER OF THE STOMACH.

Cancer of the **stomach** has been universally regarded as an incurable disease, and its treatment as mainly symptomatic and palliative, considered apart from those surgical procedures which have, in recent years, been applied to certain forms of this affection. It is a disease of frequent occurrence, for cancer affects the stomach more often than any other organ, and its frequency is said to be steadily increasing.*

Although cancer of the stomach is an incurable malady, we have had reason to believe that the rapidity of its course, in some of its forms, may be considerably modified by appropriate medical treatment, and the comfort and strength of the patient maintained even for many years.

As the **causes** of cancer, and the conditions that give rise to its development, are, at present, but little known, no causal indications for treatment can be formulated. The attainment of a certain age

* Einhorn: "Diseases of the Stomach" (second edition), p. 249.

seems to be one of the conditions of its occurrence, cancer of the stomach being especially a disease of middle and advanced life. It is rarely encountered in persons under thirty years of age, it is most common between forty and sixty; but a goodly number of cases occur between thirty and forty, and after sixty.

It is widely believed that chronic gastric ulcer is a predisposing factor, and many cases have been observed in which cancer formation was found to have developed on the rim or scar of a gastric ulcer. The opinion that cancer is of parasitic origin is a popular one, although it cannot be said to be, as yet, established.

The seat of cancer of the stomach is, in the great majority, viz., in four-fifths of the cases, limited to that comparatively small portion of the stomach containing its two orifices—the cardia and the pylorus—and the intermediate lesser curvature. The fundus is very rarely affected, in not more than 1½ per cent. of all the cases. The pylorus, or its immediate neighbourhood, is the part most frequently attacked; three-fifths of the cases of gastric cancer are seated at the pylorus, and it is in this proportion, of all cases of cancer, that the morbid conditions we have to treat are those resulting from pyloric obstruction.

Gastric cancer is almost always primary.

Cancer, located at the cardiac or pyloric orifices, naturally gives rise to mechanical difficulties either in the entrance of food into the stomach or in its escape from it, and to the symptoms and morbid manifestations dependent thereon. Cancer not involving either of these situations, and not interfering with the entrance or exit of the food, may long exist without giving rise to any characteristic symptoms, and may even remain undetected throughout its whole course.

It is important to bear in mind, especially in estimating the probable result of surgical operation, that gastric cancer is often attended by secondary

cancerous deposits in other organs, and most frequently in the liver.

The **symptoms** of cancer of the stomach are not always clearly diagnostic, inasmuch as many of them are common also to cases of chronic gastric catarrh with dilatation from other causes, and to cases of chronic ulcer. The loss of appetite, the pain after taking food, the flatulence and dyspepsia, the vomiting, the sour eructations, the progressive emaciation, the occurrence of hæmatemesis, the constipation, the presence of blood in the stools, the tenderness in the epigastric region, and the signs of dilatation of the stomach may all exist without the existence of cancer; and it is on this account that it has been thought impossible to diagnose, with accuracy, the presence of cancer of the stomach, unless there are clear signs of a *tumour* in the epigastrium.

There are, however, certain appearances which, taken collectively, point strongly to the existence of cancer, although neither of them alone may be absolutely diagnostic. One of these is the peculiar colour of the complexion, which is associated with the progressive emaciation—that aspect which has been termed "earthy," or "waxy," or "fawn-yellow," or "dirty-yellow, cachectic colour," none of the terms expressing very well the peculiar type of complexion which so commonly accompanies malignant visceral disease, but which is readily recognised by the experienced eye.

The *loss of appetite* is usually much more complete and persistent in cancer than in chronic ulcer or chronic catarrh.

The *pain* of cancer is often almost continuous, and not merely excited by the presence of food, as in simple ulcer, and when it is dependent on the presence of food it usually appears not immediately after taking food, as in ulcer, but when digestion is more advanced; this is especially the case in pyloric cancer.

The *vomiting* usually occurs a longer time after

taking food than in gastric ulcer, and in cases of cancerous obstruction of the pylorus it may not come on until some hours after the reception of food, and may be extremely *copious* from the co-existence of great dilatation of the stomach. When the cardiac orifice is the seat of cancer there is usually some dysphagia, and the food is regurgitated rather than vomited almost immediately after it is taken, unchanged, or simply mixed with mucus. Whenever we find this persistent regurgitation of food, with signs of atrophy of the stomach, such as sinking in of the epigastrium, and a difficulty or inability to pass the œsophageal bougie, together with the presence of a cachectic aspect, the existence of cancer of the cardiac orifice of the stomach is pretty certain.

"Coffee-grounds" vomit, or vomited matters coloured blackish-brown, from the presence of blood oozing from the ulcerated surface of the cancerous mass, and altered by contact with acid gastric secretions, is observed in many cases of somewhat advanced gastric cancer. *Copious* hæmorrhage is far more common in chronic ulcer than in cancer. The presence of blood in the stools (mælena) is often observed in gastric cancer, when there may be no blood in the matters vomited, or when vomiting is absent.

Occasionally cancerous particles may be found in the vomited matters; we have recorded such a case in which the diagnosis was otherwise doubtful.*

The *emaciation* and *anæmia* in cancer are usually more marked, more uninterrupted and progressive, and more distinctly cachectic than in chronic ulcer or chronic gastric catarrh.

The occurrence of fever has been several times noted in the most advanced stage of this disease, and is of evil import. The rise of temperature is not usually very high, and it has been observed, in some rare cases, to be periodical, and to resemble a malarial pyrexia. It may be accounted for either by the occurrence of an inflammatory process in the vicinity

* *Lancet*, January 29th, 1876.

of the growth, or, more commonly, by the absorption of toxins from its ulcerated surface.

It has been stated that the absence of free hydrochloric acid in the gastric juice is characteristic of dilatation of the stomach due to cancer, and that this gastric juice has a very feeble digestive power for albuminous substances. Although the absence of free hydrochloric acid in the gastric juice may be discovered in other diseases besides cancer, there seems to be little doubt that its *invariable presence* is strong evidence against the existence of cancer.* It has also been asserted that the presence of *lactic* acid developed in the stomach is diagnostic of cancer, but this has been controverted by others, although it is generally admitted that the presence of lactic acid and the absence of free hydrochloric acid help to establish a correct diagnosis. Max Einhorn† states, "Among the cases of gastric cancer that I have seen during the last few years, I knew of six in which free hydrochloric acid was present, either in normal or in greater quantities"; and he adds, "this symptom loses still more importance if we consider that absence of free hydrochloric acid is associated with many other conditions besides cancer," such as severe gastric catarrh and atrophy of the stomach. Osler,‡ in the 87 cases he analysed, found free hydrochloric acid absent in 92 per cent.

Constipation, which is usually very obstinate, and is probably due to the small amount of food digested and passing out of the stomach, is a symptom which has to be considered in the treatment of these cases. The occasional occurrence of diarrhœa is not,

* Ewald says: "In the large majority of cases of carcinoma of the stomach there is no free hydrochloric acid. This is, however, not caused by the mystic influence of the carcinoma on the production of hydrochloric acid, but simply by the accompanying catarrhal inflammation or atrophic condition of the mucous membrane of the stomach. Should these conditions be absent, then there will be a copious secretion of hydrochloric acid ("Diseases of Stomach," vol. ii., p. 397).

† "Diseases of Stomach" (second edition), p. 278.

‡ "Cancer of Stomach," p. 42.

however, uncommon. This may be due to the irritation of undigested food, or to the existence of intestinal catarrh, excited by decomposing matters proceeding from the ulcerated surface.

The careful analysis of each case as it comes before us, especially with reference to the symptoms enumerated, will usually enable us to arrive at a correct diagnosis;* but the confirmation afforded by the presence of a painful tumour in the situation of the cardiac or pyloric orifice would be desirable before operative surgical procedures would be justified.

After these preliminary considerations we may now proceed to consider the indications for **treatment** in cases of gastric cancer. The first of these is a *suitable regulation of diet.* In arranging the diet of a patient with cancer of the stomach we must endeavour to supply as much nutriment as will adequately meet the demands of the body so as to check the progressive emaciation, and at the same time reduce to a minimum the work of gastric digestion, and the pain and distress connected with it. The food we give should either be easily absorbable by the vessels of the stomach itself, and cause little or no irritation by its presence there, or it should pass readily out of the stomach and be absorbed lower down in the alimentary canal. We must not, however, under-estimate the digestive capacity of the stomach itself in all patients with gastric carcinoma, for in some it is very considerable, especially in cases of slowly progressing scirrhus pylorus, where the greater part of the gastric mucous membrane retains its functional activity. We have known such cases in which a fair amount of solid animal food was taken and digested, for many years, with only occasional attacks of severe dyspepsia. An important point to keep in view in the feeding of cases of cancerous

* Osler points out that a certain number of cases of carcinoma of the stomach in their onset and course resemble *pernicious anæmia*, and that a blood count below 1,000,000 red blood corpuscles is strongly in favour of pernicious anæmia. Megaloblasts rarely, if ever, occur in cancer of the stomach ("Cancer of the Stomach," p. 124).

stricture of the pylorus is to give such food as can be digested and absorbed *in the stomach*—or predigested fluid food—so that it may not have to pass in any quantity through the narrow pyloric outlet (or set up any irritation there), in order to be digested lower down. The starchy, farinaceous foods should therefore be avoided unless predigested, for they cannot be digested in the stomach, and we know there exists an obstruction to their passing out of that organ, and the result is that they are retained there, where they give rise to the development of lactic and butyric acids, and consequently to the occurrence of much pain, with troublesome nausea and vomiting. When farinaceous foods are found to give rise to pain, gastric distension, and vomiting, they should be suppressed, and the diet restricted absolutely to concentrated meat *solutions and foods that can be absorbed in the stomach;* or, on account of their perfect fluidity, pass easily into the small intestine. If the cancerous growth does not involve the pylorus there is not the same objection to the carbo-hydrates, because there is not then the same risk of their retention and acid decomposition in the stomach. In cancer of the stomach the food generally speaking should be fluid and concentrated, so as to be of small bulk. Milk, when well borne, is excellent in small quantities at a time. It is desirable to dilute it slightly with some alkaline water, and the addition of a little salt to boiled milk makes it more palatable. When ordinary fresh milk disagrees, peptonised milk may be substituted for it.

In hæmorrhagic cases it may be necessary for a time to feed the patient entirely by means of nutrient enemata so as to keep the stomach absolutely at rest; and indeed, in non-hæmorrhagic cases, it is a good expedient from time to time to feed the patient for a few days *per rectum*, so as to give the stomach periods of entire rest. Some prefer small enemata of 3 or 4 drams of beef peptones mixed with 2 or 3 ounces of warm water. The late Dr. Greig Smith advocated a

larger quantity, for, as he rightly observed, a certain amount of water is essential to nutrition, and he prescribed an egg beaten up with 10 ounces of milk and 2 or 3 tablespoonfuls of peptonised meat jelly, with or without brandy, to be passed into the bowel very slowly every five or six hours, when it will be retained without difficulty. Peptonised milk may also be used. The injection once or twice daily of a pint of tepid water into the large intestine, as advised by Dr. Greig Smith, we also think a wise expedient.

Professor Bauer corroborates our own view of the desirability in carcinoma of the stomach of giving "animal, highly-albuminous foods, as milk, eggs, and tender meat, and meat juices, in preference to those which, from the large amount of hydro-carbon they contain, are easily prone to abnormal and acid fermentation."

In these cases a certain amount of choice may be afforded the patient, who has often learnt by observation the particular kind of diet that suits him best. But it should always be in *small quantity* at a time; on this point few patients can be left with safety to their own inclinations.

In a few cases a dry diet has been found to agree better than a fluid one. Much, no doubt, depends on the seat of the disease and the secondary changes, such as dilatation, etc., to which it has given rise, so that each individual case must be studied carefully as to the facility with which different articles of food can be digested. In cancer of the *cardiac* orifice we are restricted to fluid food, as solid food would be arrested, and would accumulate in the œsophagus and cause dilatation. If the stricture of the cardiac orifice is considerable it may be advisable to introduce a stomach tube through the stricture and in this way introduce food into that organ; or nutrient enemata of peptonised foods may be given, such as the *pancreas and meat* enemata, already referred to.

Besides appropriate dieting, the treatment of cases

of gastric carcinoma involves the utilisation of such means as are at our disposal—(*a*) for the arrest of the abnormal decomposition and fermentation of the food retained in the stomach; (*b*) for the relief of pain, acidity, and vomiting; (*c*) for the arrest of hæmorrhage; (*d*) for the regulation of the bowels. Finally, in certain cases the adoption of surgical measures to remove the diseased part may be feasible.

When the cancer is situated at the pylorus, and there is considerable dilatation of the stomach, very good results have been obtained by washing out the stomach by means of the syphon tube,* or stomach pump, as recommended by Kussmaul. The mucous membrane is cleansed by this process, and the acid, irritating matters resulting from the prolonged retention of food in the stomach are removed. The feelings of distension and heartburn are relieved, and the tendency to hæmorrhage diminished. Constipation is also frequently removed by this process, probably by improving the general tone and facilitating the passage of food along the intestinal canal. It is unsuitable in cases of great debility or when hæmorrhage is actually taking place.

Charcoal in 10- to 20-grain doses, three or four times a day, has been found to relieve the flatulence and acidity suffered from in these cases; or a powder composed of equal parts of charcoal, subnitrate of bismuth, and carbonate of magnesia has been used for the same purpose. Ewald, however, condemns the use of charcoal as "irrational," and we are inclined to think its value has been over-estimated.

We have found the greatest benefit from the use of *creasote* or *thymol*, together with a suitable diet, in cases of cancer of the pylorus; the tendency to flatulent decomposition of food in the stomach being often completely averted. A minim of creasote in a capsule may be given thrice daily immediately after taking food, or a grain of thymol, made into a pill with powdered soap and a little spirit, may be used

* *Vide* chapter on Dilatation of Stomach, p. 102.

instead, especially when the patient objects to the odour of creasote. We have often seen such excellent results in cases of scirrhus pylorus from the persevering use of creasote that we have been led to think it must exercise a retarding effect on the growth of the cancer. *Resorcin* is preferred by some, and bismuth salicylate by others.

The risks of morbid fermentation will also be diminished and digestion promoted by giving 10 or 15 grains of pepsin, with 10 to 20 minims of dilute hydrochloric acid, after each meal containing albuminous food. This will supply the deficiency of hydrochloric acid and of digestive activity in the gastric juice of such patients, and enable them to digest small quantities of pounded meat, eggs, fish, etc.

To *relieve the pain* of gastric cancer it will often be necessary to give opium; but when the pain is associated with, and dependent upon, acidity of the contents of the stomach, the administration of an alkaline carbonate will frequently effect this object without the need of having recourse to the preparations of opium. Both pain and vomiting may often be relieved by the following combination:—

℞	Sodii bicarbonatis	gr. xv.
	Magnesii carbonatis	gr. v.
	Acidi hydrocyanici diluti	♏iv.
	Aquæ anethi	ad ℥j.

Misce, fiat haustus. To be taken three or four times a day.

Severe attacks of pain will, however, require the use of opium. A great objection to its use is that by checking the hepatic and intestinal secretions and diminishing peristalsis, it aggravates the constipation, and removes even the little appetite the patient may have. Its employment should be deferred as long as possible. Morphine, given hypodermically and combined with atropine, is, perhaps, the best method of administering it; $\frac{1}{6}$ grain of sulphate of morphine and $\frac{1}{120}$ grain of atropine will usually suffice; this quantity must be increased, if necessary. Codeia, in

doses of $\frac{1}{3}$ or $\frac{1}{2}$ grain, is a good substitute for opium. Another suitable mode of administering opium is to combine it with cherry-laurel water, as in the following:—

℞ Liquoris opii sedativi ♏v.
Aquæ laurocerasi ♏xxx.
Aquæ chloroformi ad ℥j.
Misce, fiat haustus. To be given when the pain is severe.

If *vomiting* is persistent and unrelieved by hydrocyanic acid, or this combined with opium, oxalate of cerium will sometimes succeed in arresting it. One or two grains mixed with a few grains of sugar of milk may be given every three or four hours.

Or hydrochloride of cocaine may be given—

℞ Cocainæ hydrochloridi gr. ij.
Aquæ laurocerasi ℥j.
Aquæ destillatæ ad ℥iv.
Misce, fiat mistura. A tablespoonful every hour until relieved.

Iced water or effervescing soda water or iced milk may be at the same time taken in small quantity, or fragments of ice may be sucked. Cold compresses to the epigastrium have been found useful. When the patient does not object to washing out the stomach this measure will contribute to the relief both of pain and vomiting.

The occurrence of serious *hæmorrhage* will require the same mode of treatment as that described for hæmorrhage from simple ulcer.

The constipation accompanying gastric cancer is best relieved by enemata, and these by unloading the intestine often greatly relieve the suffering caused by flatulent distension. In some cases a grain or two of watery extract of aloes, with two of soap, in a pill, daily, at bed-time, is well tolerated; or half a dram or a dram of the aromatic syrup of cascara sagrada.

Cajuput oil has been recommended for the relief of flatulence. It may be given in capsules, or it may be dropped on a small lump of sugar and swallowed.

When the more urgent dyspeptic symptoms have been relieved, and the patient is enabled to take and digest a sufficiency of suitable food, the anæmia and debility which are always present in these cases indicate the use of tonic remedies. We have found the following combination answer well:—

℞ Ferri et ammonii citratis gr. v.
Liquoris bismuthi et ammonii citratis... ♏xx.
Sodii bicarbonatis gr. x.
Infusi calumbæ ad ℥j.

Misce, fiat haustus. To be taken three times a day, an hour before meals.

Or the following:—

℞ Ferri et quininæ citratis gr. v.
Liquoris strychninæ ♏iij.
Acidi hydrochlorici diluti ♏v.
Aquæ ad ℥j.

Misce, fiat haustus. To be taken an hour after food, thrice daily

Condurango bark was introduced by Friedreich as a remedy for cancer of the stomach, and recently its use and efficacy have again been testified to in the treatment of this disease. The most remarkable effects have been ascribed to its use; 30 grains of the powder may be given four or five times a day, or a decoction may be used. It has been said by some that it has always given relief, the pain has disappeared, the digestion has improved, and the tumour has either ceased to increase in size or has disappeared entirely. But it has not given such brilliant results as these in the experience of the majority of those who have tried it. It has, however, been established by experimental tests that it does increase the digestive secretions, the gastric juice, the bile, and the pancreatic juice—especially the two latter; and that it may in this way do good in chronic disease of the stomach. Gerhardt has found it useful in the treatment of old gastric ulcer, and in cancer it has improved appetite and lessened pain and catarrh.

Max Einhorn also states that he gives it in the greater number of cases of cancer of the stomach.

Reiss has made elaborate investigations into the effects of condurango in gastric cancer, and he concludes that an unprejudiced observer, after watching a large number of cases, would be of opinion that life is greatly prolonged by a course of treatment with it. Ewald also states that he has repeatedly observed the good effect of this drug on the general symptoms of cancer of the stomach, and he considers the observation of Reiss most important, and that his advice to give large quantities of this remedy should be followed.*

Sodium iodide has been given by Boas in a case of œsophageal cancer for more than six months (30 to 45 grains a day), and the patient gained weight and remained free from symptoms the whole time. Einhorn has also noted "transient good results" from this drug in several cases of cardiac stenosis. The latter authority also mentions arsenic (3 minims of Fowler's solution thrice daily) as sometimes attended with benefit.

Methyl-blue (*Pyoktanin*) has been given in cases of gastric carcinoma by Max Einhorn, and he states with beneficial effects. In three cases out of eight in which he administered it he noticed "a great improvement of most of the morbid phenomena," and in one he thought the gastric tumour became somewhat smaller after three weeks' use of this drug. This patient took it for eight or nine months regularly, and was all the time free from pain and did not lose flesh. But the improvement was not maintained. He gives two or three grains in gelatine capsules once or twice daily.

Ewald and Einhorn both speak highly of a 3 per cent. solution of chloral hydrate, a tablespoonful every two or three hours, for the alleviation of the discomforts caused when ulceration is in progress or decomposition of food is taking place.

The surgical operative procedures usually proposed for the relief of gastric cancer are the following:—

* "Diseases of the Stomach," vol. ii., p. 419.

1. **Gastrostomy.**—This operation may be resorted to in cases where the cardiac orifice of the stomach is constricted by a cancerous growth, especially in cases of annular stricture; it is less applicable in cases where the new growth is extensive and involves any considerable portion of the anterior wall and greater curvature—nor in any case is it likely to do more than prolong life for a short time. The operation is usually performed in two stages, and the stomach is not opened until adhesions have been established between the wall of the stomach and that of the abdomen. But when the urgency for administering food is very great, it is easy to give some concentrated fluid food in small quantities before the stomach is opened, by means of a larger kind of hypodermic syringe with a long needle—a syringe capable of holding half an ounce or an ounce, which can be repeatedly refilled while the needle remains in the stomach. Mayo Robson says of gastrostomy, "If it be performed sufficiently early, and if it be done according to the best methods, it may be included among the most useful and beneficent operations the surgeon is called upon to perform."

With regard to the subsequent introduction of food into the stomach, it has been suggested that "solid food may first be subjected to thorough mastication and insalivation, and then transferred by the patient from the mouth to a small funnel connected with the distal end of the catheter, where it is made to enter the stomach by blowing it through the tube, or it may be aspirated by the patient's sudden respiratory efforts. Mastication of food as a preliminary step to its introduction into the stomach, satisfies, at least in part, the sense of hunger."

2. **Pylorectomy,** or resection of the pylorus, an operation which is, of course, designed for the relief of malignant stricture of the pylorus. It consists in the removal of the pylorus and as much of the adjacent portions of the stomach and duodenum as may be involved; the divided walls of the stomach

and the bowel are brought together and united by sutures. Another method, now frequently adopted, is "to close completely both the stomach and duodenal openings, either by a purse-string suture or by a double row of stitches, and then to connect the bowel to the stomach, making either a gastro-duodenostomy or a gastro-jejunostomy."* Professor Kocher prefers this operation, which has been very successful in his hands.

The objections made to pylorectomy are—(*a*) that it is itself a very fatal operation; (*b*) that there is a great tendency to early diffusion of malignant disease when situated within the peritoneal cavity, and there is little chance of complete removal of the cancerous deposits; (*c*) the tendency of the growth to the contraction of firm adhesions to surrounding parts; (*d*) the great length of time required for the operation; and (*e*) the risk of speedy recurrence. In opposition to these objections it has been urged that the operation is usually too long postponed, and that when performed early much better results are obtained. In 572 cases collected by Mr. Mayo Robson the mortality was only 30·4 per cent., whereas in some previously published statistics it was as high as 76 per cent.;† but it must be remembered that in earlier stages there may be considerable uncertainty in diagnosis, and that many cases of scirrhus disease of the pylorus tend, with suitable feeding and medicinal treatment, to run a very prolonged course, and live for many years in tolerable comfort.

3. **Gastro-enterostomy**, that is, the establishmant of a permanent fistulous opening between the stomach and some part of the small intestine, usually the upper part of the jejunum.

A considerable number of such operations have now been successfully performed, and the statistics of the more recent operations are far more favourable

* Mayo Robson, "Hunterian Lectures on the Surgery of the Stomach."

† Treves' "Operative Surgery," vol. ii., p. 436.

than those formerly reported, a result, no doubt, due to the circumstance that operative proceedings are now had recourse to much earlier than used to be the case.

In this operation it is, of course, extremely important to make the communication between the stomach and the *upper* part of the jejunum as near the pylorus as possible. Cases have been examined *post mortem* in which the juncture was found to have been made but a short distance from the ileo-cæcal valve!

This operation affords, perhaps, the best chance of successful palliation in cases of malignant stricture of the pylorus, when the sufferings of the patient are urgent and the failure in nutrition is rapidly progressing.

4. **Jejunostomy.**—When owing to the situation of the carcinomatous growth it is not practicable to make any operation upon the stomach itself, life has probably been prolonged by making a fistulous opening into the jejunum and introducing food through this channel.

5. **Total or partial gastrectomy.**—The bold operation of removing the entire stomach for cancer was successfully performed by Schlatter, of Zurich, in 1897, and this operation has been repeated by several American surgeons since, and in a few instances with success. Schlatter's case survived the operation fourteen months.

Partial gastrectomy for gastric cancer has been repeatedly performed. Langenbach in 1894 excised seven-eighths of the stomach and sutured the pylorus to the small cardiac portion of stomach remaining, and the patient made a good recovery.

The progress of gastric surgery has certainly been most remarkable and rapid of late years; but to ensure satisfactory results in cases of malignant disease it is most essential that surgical aid should be sought for early; and when the diagnosis is doubtful, but the symptoms urgent, an exploratory laparotomy should be advised.

Loreta's operation for the forcible divulsion with the fingers, after gastrostomy, of a stricture of the cardiac or pyloric orifice of the stomach, is only applicable to non-malignant cases, and then the operation of pyloroplasty is generally preferred.

ADDITIONAL FORMULÆ.

Mixture in gastric ulcer.

℞ Bismuthi carbonatis, ʒij.
Acidi hydrocyanici diluti, ʒj.
Liquoris morphinæ hydrochloridi, ʒj.
Mucilaginis, ʒvj.
Aquæ chloroformi ad ℥ij.
M. f. mist. A teaspoonful every three hours. (*Whitla.*)

In convalescence from gastric ulcer.

℞ Syrupi aurantii corticis, ʒv.
Decocti condurango (1 to 9), ad ℥vj.
M. f. mist. A tablespoonful three times a day. (*Bamberger.*)

Mixture in gastric ulcer.

℞ Bismuthi carbonatis, ʒij.
Sodii bicarbonatis, ʒj.
Tincturæ belladonnæ, ʒjss.
Infusi gentianæ ad ℥vj.
M. f. mist. Two tablespoonfuls three times a day. (*Ord.*)

In gastric ulcer with hæmatemesis.

℞ Plumbi acetatis, gr. iij.
Morphinæ hydrochloridi, gr. jss.
Sacchari albi, ʒj.
M. et divide in pulv. x. A powder every two hours.
(*Bamberger.*)

Or

℞ Acidi tannici, gr. xii.
Opii pulveris, gr. jss.
Sacchari albi, ʒj.
M. et divide in pulv. vj. A powder every two hours.
(*Bamberger.*)

In gastric ulcer with flatulent dyspepsia.

℞ Potassii iodidi, gr. vj.
Potassii bicarbonatis, ʒjss.
Tincturæ aurantii, ʒiij.
Infusi calumbæ ad ℥vj.
M. f. mist. Two tablespoonfuls an hour after food.
(*Brinton.*)

Resorcin and condurango for gastric cancer.

℞ Resorcin puri, gr. xxx.
Tincturæ rhei, ʒjss.
Syrupi aurantii, ʒv.
Decocti condurango (1 in 12) ad ℥vj.
M. f. mist. One tablespoonful every two hours.
(*H. Menche.*)

Condurango Mixture for gastric cancer.

℞ Condurango corticis, gr. cl.
Aquæ, ℥iij.
Boil for ten minutes, and add
Syrupi, ʒv.
Aquæ ad ℥vj.
M. f. mist. A tablespoonful every hour or two. (*Reiss.*)

As an antiseptic in gastric carcinoma.

℞ Sodii sulphitis, ʒss ad ʒj.
Infusi quassiæ (1 %), ℥jss.
M. f. haust. To be taken three times a day. (*Jenner.*)

Alkaline and rhubarb powder for gastric ulcer.

℞ Sodii bicarbonatis, ʒij.
Potassii bicarbonatis, ʒij.
Pulveris radicis rhei, ʒiv.
Sacchari lactis, ʒj.

M. f. pulv. As much as will go on the end of a knife to be taken dry every hour. (*Ewald.*)

Tonic in gastric cancer.

℞ Extracti condurango, ʒxii.
Strychninæ sulphatis, g. ½.
Acidi hydrochlorici diluti, ʒiii.
Elixir gentianæ ad ℥viii.

M. f. mist. A tablespoonful, in a wineglass of water, to be taken through a tube after meals. (*Hemmeter.*)

CHAPTER V.

DISEASES OF THE STOMACH—THE TREATMENT OF DILATATION OF THE STOMACH, OR GASTRO-ECTASIS.

DILATATION OF THE STOMACH—Causes—Symptoms—Vomiting—Physical Examination—Indications for Treatment—Dietetic Measures—Model Dietary—Emetics—Purgatives—Carlsbad Water—Tonics—Electricity—Massage—Antiseptics—Lavage—Hydrotherapy—The Stomach Syphon and Pump—Surgical Treatment—Pyloroplasty—Gastro-plication—Large Doses of Olive Oil.

Dilatation of the stomach is a necessary consequence of stricture or obstruction at the pylorus, malignant or non-malignant, arising in the walls of the stomach itself or external to it, and the treatment of this condition has been incidentally referred to in discussing the management of cases of gastric cancer.

But there are other causes of gastric dilatation, and it is to these we must, in the first place, refer.

The habitual consumption of excessive quantities of food or drink is calculated to lead, in course of time, to dilatation of the stomach, by repeated abnormal distension of that organ, so that it is common in habitual beer drinkers. Dilatation may also originate in an enfeeblement of the muscular coat of the stomach, brought on by debilitating diseases, such as chlorosis and anæmia, tuberculosis, typhoid and other fevers. Adhesion of the stomach to an adjacent organ, as, for instance, from the local peritonitis set up by a perforating ulcer, may also cause dilatation by interfering with its muscular movements.

Broadbent suggests that it is sometimes due to an anatomical peculiarity which hinders the expulsion of the products of digestion: "The pylorus is suspended high up in the epigastrium by a short lesser omentum. . . . If the stomach is distended and overloaded it is dragged down by the weight of its

contents, and an acute flexure is formed at the junction of the duodenum and pylorus, which constitutes an obstacle to the passage of the chyme."* Bennett argues that "extreme dilatation" may be sometimes due to "spasm of the pyloric sphincter;"† and several authorities have called attention to the fact that a movable right kidney may be the cause of intermittent gastric dilatation.

Mayo Robson also points out that, in some cases of gall-stones, adhesions set up between the pylorus and the gall-bladder and liver may give rise to dilatation of the stomach.

Chronic gastric catarrh is a common cause of dilatation of the stomach, for not only does it lead to impairment of muscular contraction from defective nutrition, but as the secretion of gastric juice is defective and absorption therefore retarded, the food is delayed in the stomach, abnormal fermentation is set up, and flatulent distension, as well as accumulated ingesta, increases and aggravates the dilatation due to enfeeblement of its walls.

Retained ingesta, from whatever cause, and enfeeblement of the muscular walls of the stomach, however produced, are the essential conditions of gastric dilatation; increase of pressure from within, or diminished resistance in the walls of the stomach, or both together.

Cases of *acute* dilatation seem, in all instances, to be due to atony of the muscular walls, brought about usually by exhausting illnesses.

Many careful observers have directed attention to the frequent occurrence of gastric dilatation in rickety infants and young children. Both in breast-fed and hand-fed infants of feeble digestive power this morbid state may be detected—the digestive processes are retarded, and as the child is constantly being fed, food accumulates, and is abnormally retained in the stomach, where it undergoes fermentive changes.

* *Brit. Med. Journ.*, Dec. 2nd, 1893. † *Ibid.*, Feb. 3rd, 1900.

The coincidence of gastric dilatation with symptoms of nervous depression, hysteria, and hypochondriasis, has prompted the suggestion that the nervous conditions may have preceded and caused the dilatation.

It has been pointed out that an ulcer situated near the pylorus may cause spasmodic stricture of that orifice, and consequent dilatation of the stomach, and if the ulcer is healed the stricture and dilatation will disappear.

The consequences of dilatation of the stomach, however induced, are the lingering of food in that organ and the setting up of morbid fermentation and the production of toxic putrid substances, such as poisonous ptomaines. So that not only is the general nutrition gravely compromised, but the absorption of toxic substances tends to further seriously disturb the health of the patient.

The **symptoms** of dilatation of the stomach when this is caused by pyloric stenosis will, of course, have been preceded by those of the original disease. But dilatation of the stomach, from whatever cause, is usually attended with a group of more or less characteristic symptoms, some of which are, however, common to other forms of dyspepsia.

There is usually a sense of weight and fulness about the epigastric region, aggravated by taking food, and not unfrequently accompanied by a constant wearing pain, referred mostly to a particular spot in the epigastrium which is sensitive to pressure. Heartburn and nausea, with foul, acid eructations of fluids and gases, the latter sometimes not only putrid but even combustible, are complained of, and the patient's countenance is usually thin, pale, worn, and anxious. There are also usually great general emaciation and loss of strength.

Vomiting, although not an essential symptom, frequently occurs, and in cases of considerable dilatation is very characteristic. The quantity vomited is sometimes enormous, and it gushes out as if pumped up

from the stomach, and is often unattended by nausea. The vomited matters consist of turbid, sour, bad-smelling liquid, composed of tenacious mucus and the residue of half-digested food in a state of fermentive decomposition, with sarcinæ and other low organisms; if it contains also dark coffee-ground matters, there is reason to fear the existence of pyloric cancer, and if bright blood be present, that of gastric ulcer. One of the most characteristic points to be noticed in the substances vomited is the presence of portions of undigested food taken long, it may be days or even weeks, before! The vomiting often occurs at regular intervals of twenty-four or forty-eight hours, or even longer. There is usually loss of appetite, but occasionally there may be a morbid craving for food, due to the defective absorption of nourishment.

Disturbances of cardiac action are often complained of, such as palpitations, intermittent and irregular pulse, and dyspnœa, especially on lying down at night, and these are due to displacement upwards of the diaphragm and pressure on heart and lungs from the dilated stomach.

Constipation is a common accompaniment, consequent on the imperfect emptying of the stomach. Owing, also, to the small absorption of fluids, the urine, in advanced cases, is frequently diminished in quantity. Coldness of the extremities is usual, and *cramps* of the voluntary muscles have been often observed by Kussmaul, and referred by him to the abnormal dryness of the muscular and nervous tissues from deficiency of water in the blood.

Mayo Robson * has also called attention to the fact that "severe muscular spasms of a tetanoid character . . . are frequently associated with dilatation of the stomach." The cause he considers to be "a double one. . . First, the absorption of some poison from the dilated stomach, which increases the excitability of the nervous system; and, secondly, a reflex effect produced by the painful contraction of the pylorus."

* *Lancet*, March 24th, 1900.

In such cases he suggests that "surgical treatment is well worth considering."

Physical Examination of the region of the stomach affords an important aid to diagnosis. In cases of great dilatation the stomach may be seen to bulge the abdominal wall, and its outline may be defined with distinctness. The outline of the stomach may be rendered more distinct by distending it with carbonic acid gas (as suggested by Frerichs), by first giving 30 grains or more of bicarbonate of soda, and then immediately afterwards 20 or more grains of tartaric acid, each dissolved in a little water. Movements of the stomach, especially if its muscular walls be hypertrophied, may also be sometimes seen through the thinned abdominal walls. A *splashing* noise may often be produced on shaking the patient when upright. This would not be diagnostic of itself, as a somewhat similar sound may proceed from the colon, but it would lend weight to the significance of other symptoms.

Percussion in the recumbent position usually reveals an extended area of gastric resonance, stretching upwards above the left hypochondrium, and downwards to or below the umbilicus; and on the erect attitude being assumed, a band of dulness will usually be detected (caused by the gravitation of the fluid contents of the stomach) over the lower part of this area. It is rarely necessary to use Leube's stomach sound, but when introduced its point may usually be felt below the umbilicus, and it then indicates the lowest level of the greater curvature.

It is important in this connection to remember that the size of the stomach varies greatly in different individuals. Ewald estimates the maximum normal capacity at 1,600 c.c. (56 oz. = nearly 3 pints).

As Clifford Allbutt points out, in acute or early cases, before the whole stomach is dragged down, it is as important to notice the situation of the upper line of the stomach as that of the lower, which he has found to reach as high as "the fourth or even the

third rib." This seems very high, and would involve considerable dyspnœa and palpitation, as the diaphragm would be pushed up to this extent, and the action of the heart and the expansion of the lung much embarrassed.

We have often found the upper limit of gastric resonance considerably raised, but never so high as the third rib.

Having now passed in brief review the causes and symptoms of gastro-ectasis, we must, in the next place, consider what modes of treatment are best calculated to cure or alleviate this affection.

The following **indications** for **treatment** are sufficiently clear; the only question is how best to carry them out:—

1. To remove the decomposing residue of food, and cleanse the stomach.
2. To prevent putrid fermentation by antiseptics, and by other means, such as careful dieting.
3. To impart tone to the feeble muscular walls of the stomach, to promote gastric digestion, and to supply nourishment, if necessary, in other ways.
4. To remove constipation.
5. To have recourse to surgical measures when the dilatation is due to pyloric obstruction, and does not yield to medicinal and dietetic treatment.

In advanced cases, with great and long existing distension, it will be difficult to carry out these indications except by the mechanical emptying and washing out of the stomach; but in less advanced cases of simple dilatation from atony of the gastric walls, and not dependent on organic obstruction, other means, medicinal and dietetic, will suffice, if diligently carried out, to effect a cure. When there is no objection on the part of the patient to "lavage" of the stomach, and nothing in the history of the individual case to contra-indicate it, it may be applied in both classes of cases; but great reluctance to submit to this treatment,

especially in slight cases, is often encountered, and it is necessary, therefore, to be ready with other measures.

Leaving for subsequent consideration the application of "lavage," we will proceed to consider those other remedies.

And first, with regard to the necessary dietetic measures: it has been said that in such cases we should order small quantities of food frequently: it is certain that the food should be *small* in quantity, concentrated and easy of digestion, or pre-digested, but we entirely object to *frequency* of feeding.

In such patients the process of digestion is often excessively slow, and even small quantities of food, if given frequently, will tend to accumulate and undergo morbid fermentation.

The supply of liquids should be strictly limited, and only a very small quantity allowed to be taken at meals—not more than 3 or 4 ounces; and it is better, if possible, to put off taking even this amount until an hour after the meal. When there is a craving for fluids, it is a good plan to let the patient sip a teacupful of hot water half an hour before a meal; we shall thus lessen the desire to drink during the meal. And as a certain amount of water is needed for the physiological requirements of the body, and is also useful for cleansing the stomach, it is easy to supply this by causing the patient to drink a small teacupful of warm water or warm alkaline mineral water, such as Vichy, Vals, or Apollinaris, half an hour before each meal and at bed-time.

Ewald lays great stress on the need of abstaining from liquids; he says, "I only allow a small quantity of milk, from a tea- to a table-spoonful, taken at short intervals." Still, as we have already said, a certain amount of water is a physiological necessity, and this, therefore, should be supplied in the way and at the times we have indicated, or, if needful, the requisite amount of water may be given by rectal injections.

As the food must be in small quantity, and therefore concentrated, it should be chiefly animal. The lean of tender meat from which all fibrous and tendinous structures have been removed is the best, and when there is any uncertainty as to its due mastication by the patient, it had better be mechanically divided by **mincing** or pounding before it is taken. Chicken, white game, fish (the more delicate kinds), lightly-boiled eggs, are also suitable forms of animal food. Bread and other starchy foods (carbohydrates) must be taken in small quantity only, as they are prone to linger in and set up acid fermentation in the feeble, dilated stomach. All vegetable substances that tend to produce flatulence must be rigidly discarded. A small quantity of the most easily-digested fresh vegetables may be taken in the form of purées. Some of the light farinaceous foods may also be taken in small quantities at a time, as tapioca, sago, rice, and macaroni.

It is highly desirable, however, that the animal and vegetable foods should not be taken *together*, but certain meals should consist almost *wholly* of concentrated animal food, and others wholly of carbohydrates or purées of fresh vegetables. Carbohydrates being digested in the small intestine, their presence in the stomach together with animal food only retards the digestion of the latter. If the dilatation depends on stricture of the pylorus, it will be desirable to limit the food *entirely*, at any rate for a time, to such substances as can be absorbed in the stomach, *i.e.* to *nitrogenous* animal substances. Butter, sugar, and all rich sauces must be forbidden.

It may be desirable, in some severe cases, attended with troublesome vomiting, to adopt for a time a strictly milk diet, giving the milk mixed with crushed ice in small quantities at a time and at suitable intervals. *Condensed* peptonised milk is warmly praised by Ewald.

Professor Bouchard has rightly insisted on the

necessity of keeping the meals as far apart as possible; nine hours, he says, should intervene between breakfast and dinner, and fifteen between dinner and breakfast. We have ourselves no doubt that one reason why dietetic measures fail in some of these cases is that food is allowed to be taken too frequently, gastric digestion being *very slow* in many of these patients. Dujardin-Beaumetz also insisted that there should be no eating between breakfast at 11 a.m. and dinner at 7.30 p.m.

If the patient complains of faintness with cravings for food because of these long intervals between meals, he may be allowed to take occasionally a small wine glassful of meat juice or some other liquid food, such as panopepton or liquid peptinoids.

The best beverage is pure water, but a little red wine, well diluted with water, may be allowed. Tea, coffee, or cocoa, certainly during the early part of the treatment, should be wholly forbidden. Subsequently, when digestive power has been to a certain extent regained, a little unsweetened tea or coffee may be occasionally permitted.

Much use may be made, as Ewald points out, of **nutrient enemata** in these cases. They prove an essential aid to the supply of nourishment, and by their help we may for days keep the stomach almost entirely unoccupied. They also afford a means of supplying water to the system, which is greatly needed. If a long tube is used, and passed up as high as it will go without bending on itself, the patient being in the knee-elbow position, a considerable quantity (8 or 10 oz.) of fluid food will be retained at a time.

The following sketch of a model dietary for cases of dilatation of the stomach may prove useful:—

8 A.M.—*Breakfast.*—Two poached or lightly boiled eggs, or a small grilled sole flavoured with lemon-juice, 1 oz. of thin toast, followed by 2 to 4 oz. of beverage—water, or hot milk and water (if milk agrees).

1.30 P.M.—A small teacupful of hot water.

2 P.M.—*Luncheon.*—4 to 6 oz. of boiled rice, or tapioca, or sago, with a little fruit jelly; or macaroni, with a little grated cheese; 4 oz. of water, or weak brandy and water. } A little cream may be used in preparing these.

7.30 P.M.—A cup of hot water.

8 P.M.—The lean of a mutton chop; or a slice of the lean of roast or boiled mutton or chicken (about 3 oz.); 1 oz. of purée of potato, 1 oz. of dry toast; 4 oz. of water or weak brandy and water.

11 P.M.—A tumblerful of Vichy water (made hot).

A cup of milk and water or two or three tablespoonfuls of panopepton may be taken during the night if the need for food be felt.

This dietary admits of obvious variations, in accordance with the principles laid down, and the quantities may be increased as the patient's condition improves.

It is generally advisable to keep the patient *absolutely at rest* when following a restricted diet of this kind.

Kussmaul has advised that the patient should wear an abdominal bandage, and should lie on the right side the greater part of the day, so as to promote the escape of food from the dilated stomach. The bandage, especially if accompanied by a light epigastric pad, causes more intimate contact of the contents of the stomach with its walls, and consequent increase of movement and secretion.

Before proceeding to apply some such dietary, or to make use of the medicinal means we shall immediately describe, it is undoubtedly desirable to cleanse the stomach of its decomposing contents and morbid secretions; and when the patient objects to this being done with the stomach pump, or syphon tube, there are still two other measures, either of which may prove satisfactory.

We may empty the stomach, as recommended by Dr. Hare, by means of an emetic. He used to prescribe 24 grains of powdered ipecacuanha for this purpose with excellent results.* It has, however, been objected to the use of emetics (Leube) "that they never secure a complete expulsion of the fermenting ingesta," and that in advanced cases the

* *Transactions* of Medical Society of London, vol. xi., p. 20.

loss of muscular tone is so great that it is difficult, if not impossible, to excite vomiting.* In such cases the use of purgatives is preferable, and good results have been obtained by the use of Carlsbad water for this purpose. A glass of the water should be given cold every half hour, in the morning, fasting, until it causes an action of the bowels. By this means the residue of ingesta is carried off through the pylorus, and the Carlsbad water relieves also the co-existing gastric catarrh. It is often necessary to increase the purgative effect of the natural Carlsbad water by adding a teaspoonful of the Carlsbad salts to each glass. We consider this a good plan of treatment in dilatation due simply to atony of the gastric walls, and we have also known instances of organic obstruction greatly benefited by the Carlsbad course, but this method is not of course applicable to cases of advanced stenosis of the pylorus.

The plan of attempting to increase the digestive activity of the stomach by giving 10 or 15 drops of dilute hydrochloric acid after each meal, with or without 6 or 8 grains of pepsin, has many advocates, and certainly should not be overlooked. Ewald advises this dose of hydrochloric acid to be given every hour, in a tablespoonful of water, through a glass tube, and in cases of carcinoma to give it in an infusion of condurango. Bitters to promote gastric secretion and strychnine or nux vomica to restore tone to the gastric muscle are useful in many cases. Three or four minims of liquor strychninæ, or 10 to 15 minims of tincture of nux vomica, with 10 of dilute hydrochloric acid and an ounce of infusion of calumba, should be given an hour after food three times a day. Or if there are acid eructations or complaints of heartburn, it may be better to give the tincture of nux vomica and the infusion of calumba with 15 or 20 grains of sodium bicarbonate half an hour before meals.

* Von Ziemssen's "Cyclopædia of the Practice of Medicine," vol. vii., p. 332.

External faradic applications have also been found of use in restoring tone to the gastric muscles. *Massage* has likewise been found advantageous, and it seems possible, by this measure, not only to promote the passage out of the stomach of the residue of the food retained there, but also to rouse, to a certain degree, the tone of its muscular walls.*

Constipation, when it exists, must be overcome, either by saline aperients, as Carlsbad water, taken in the manner already described, or by a pill of aloes, soap, and ipecacuanha every night if necessary.

℞ Aloes pulveris gr. j ad iij.
Ipecacuanhæ pulveris gr. ½.
Saponis gr. j.
Misce, ut fiat pilula.

Ewald has given subcutaneous injections of aloin with good results.

The usefulness of **antiseptic** agents for the purpose of preventing putrid decomposition of the contents of the stomach is now widely recognised.

Pills of creasote or of thymol, taken immediately after food, or sulphurous acid in dram doses, or salicylate of bismuth (℞ Bismuthi salicylatis, magnesii carb. āā 5 grains; m. f. pulv.; to be taken after each meal), or chloroform water may be given both for its sedative and antiseptic effects.

Sir Wm. Broadbent recommends sodium sulphite

* Hirschberg ("Massage de l'abdomen," *Bull. de Thérap.*, 1887, t. cxii., p. 248) recommends the following mode of applying massage in cases of dilatation of the stomach:—First, by means of percussion and succussion the lower limit of the dilated organ is marked out, then with the palm of one or of both hands pressure, at first very gentle and afterwards gradually augmented, is made, passing from the left and lower limit towards the pyloric region. Then, placing the ends of the fingers stretched out over the inferior and left boundary of the stomach, light pressure is made with them, passing as before towards the pylorus. The pressure, at first slight, should be progressively increased. After five or six minutes of these manipulations, kneading and compression of the stomach should follow; then pushing the fingers down as far as possible, we should try to knead gently and lightly the contents of the stomach, pressing at the same time with the hands from below upwards and from left to right.

in 5 to 10 grain doses, with sodium bicarbonate and nux vomica between meals when the gas eructated has the odour of sulphuretted hydrogen. He also speaks highly of a mixture of sodium sulpho-carbolate in doses of 5 to 10 grains with sodium bicarbonate, spirits of ammonia, and gentian, given at a certain interval after meals. He has also found benefit arise from the use of a pill composed of $\frac{1}{24}$ grain of perchloride of mercury, $\frac{1}{24}$ grain of strychnine, and 1 minim of creasote taken between meals.*

An important adjunct to these other measures is regular exercise in the open air—preferably the air of the country; gentle gymnastic exercises are also useful, and the circular douche applied to the region of the stomach, the spinal douche, and other tonic hydrotherapeutic treatment, by raising the general tone of the nervous and muscular systems, will often prove of great assistance in treating these cases.

We now approach the consideration of the mode of treating dilatation of the stomach so strongly advocated by Kussmaul and Leube, and adopted by many other physicians, viz. the mechanical emptying and **washing out** the stomach by the stomach pump or syphon tube. Leube says, "With the introduction of this practice the treatment of dilatation of the stomach has for the first time become a rational one, and all other remedies sink by comparison into the second and third rank"; and Ewald says, "The advantages resulting from this method are evident, and the only wonder is that it was not made use of earlier." This radical measure, when it is well tolerated by the patient, is no doubt one of the most efficacious of curative processes, but it is intolerably repugnant to many. Ebstein† has applied this method even to infants under a year old, using a No. 8 to 10 Nélaton's catheter, and washing the stomach out with warm water containing a little benzoate of magnesia.

* *Brit. Med. Journal*, December 9th, 1893.
† *Arch. für Kinderheilkund.*, Bd. iv. s. 325.

Plain warm water or water containing a little borax in solution may be used. Some use the stomach pump at first when the contents of the stomach are "bulky and lumpy." The syphon tube can be employed later, and may be managed by the patient himself.

Leube prefers the stomach pump, and does not approve of the patient being left to wash out his own stomach. "The syphon has the disadvantage that it can withdraw from the stomach only fluids or substances which are very nearly fluid, and resort must be had to the pump to remove the remnants of the ingesta . . . and the removal of the ingesta to the fullest extent possible is altogether the most important indication. . . . The operation of washing out the stomach when entrusted to the patient alone is attended with so many risks from his unavoidably awkward movements in connection with the protrusion of the lower wall of the stomach by the end of the tube, that I cannot but regard the relegation of the operation to the patient himself as extremely hazardous."*

When, however, the stomach tube is made of soft rubber, as in the instrument to be described, there is no danger of the patient injuring himself, and the simplicity of the syphon arrangement has much to recommend it, although no doubt the washing out of the stomach is not so complete as with the stomach pump, and it may be advisable to commence with the latter instrument.

The **stomach syphon,** as described by Faucher, consists of a soft rubber tube not less than 50 or 60 inches in length provided with a projecting index to show to what depth it should be allowed to pass down into the stomach. These tubes can be obtained of three sizes (Nos. 1, 2, and 3), having respectively a diameter of 8, 10, and 12 millimetres. A glass funnel is fitted to its outer end. Debove's modification

* Leube on "Diseases of the Stomach." Von Ziemssen's "Cyclopædia of the Practice of Medicine," vol. xi., p. 328.

is somewhat less supple and more resistant, so that it can be pushed more easily down the œsophagus and into the stomach.

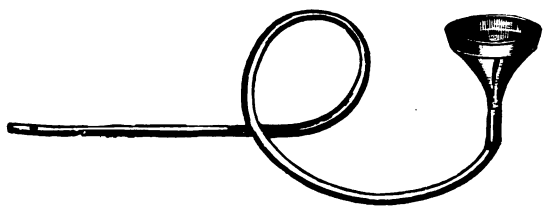


Fig. 2.—Stomach Syphon.

In first using the stomach tube it is best to begin with the smaller size, and when the patient is accustomed to its use to employ the larger ones. The tube is introduced into the pharynx in the same manner as an œsophageal bougie; you then direct the patient to make efforts at swallowing as you push the tube down into the œsophagus.* The tube should be dipped into milk to moisten it before passing. When the tube

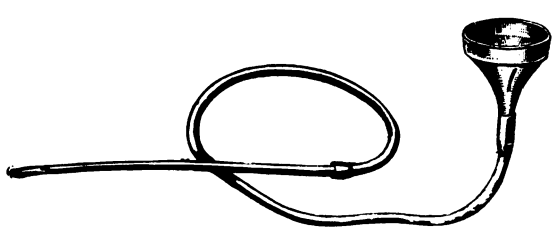


Fig. 3.—Stomach Syphon (Debove's Modification).

has passed as far as the index marked on it you affix the funnel to the outer end, and fill it with the fluid you wish to introduce into the stomach (Fig. 4); the moment you observe that the fluid has nearly dis-

* Most patients prefer the soft though larger tube of Faucher, which is passed rapidly into the œsophagus, *with the chin depressed.* Rosenheim uses a tube with several lateral openings as well as a terminal one.

appeared you lower the funnel rapidly, and the liquid contents of the stomach flow out into the vessel you have placed to receive them (Fig. 5).

Sometimes some difficulty occurs in the introduction of the tube owing to its provoking nausea, or efforts at vomiting, or even attacks of dyspnœa. This is especially the case in persons with great irritability



Fig 4.—Mode of Using Stomach Syphon.

of the fauces and pharynx: in such persons it is best to paint these parts with a 5 per cent. solution of chlorhydride of cocaine about ten minutes before attempting to introduce the syphon. Toleration of the presence of the tube in the pharynx and œsophagus is, however, rapidly established, and the patient may after a few days be encouraged to pass the tube himself.

It is usual to employ some slightly alkaline water for washing out the stomach—warm water containing about 2 grains to the ounce of sodium bicarbonate is the best. Sometimes it is desirable to use an antiseptic fluid, such as a saturated solution of boric

acid, or creasote water, or a 1 per cent. solution of sodium salicylate, or sodium sulpho-carbolate, or some tincture of myrrh may be added to the water in cases of atonic dyspepsia. If there is complaint of pain in the stomach, you may mix some subnitrate of bismuth with the water put into the funnel, and allow it time to deposit itself on the mucous membrane of the stomach, or you may use chloroform



Fig. 5.—Mode of Using Stomach Syphon.

water (2 per cent.) with the bismuth, and this has both an anæsthetic and an antiseptic action. As to the quantity of fluid to be used at each washing, this will depend on the tolerance of the patient, and the degree of dilatation of the stomach; but, if possible, washing out should be continued until the fluid that flows out is as clear and pure as that which is flowing in.

Occasionally the outflow of fluid suddenly ceases, especially if the tube has only one opening at its gastric extremity (it should have two or more), owing to this opening becoming blocked by particles of food; this can usually be washed away by allowing some more fluid to flow into the stomach. Some-

times the opening of the tube in the stomach may not be in contact with its liquid contents; this may occur when the dilatation is very great, and the tube fails to reach the contents; or if too much of the tube has been introduced it may bend on itself, and the opening may thus reach the upper and empty part of the stomach. A little manipulation of the tube will usually surmount either of these difficulties. The best time to practise washing-out is in the morning, fasting, and once a day is often enough. After a little time, once every two or three days will be enough.

The syphon, however, will not suffice, as Leube has stated, for all cases. In cases of malignant stricture of the pylorus, with enormous distension of the stomach with putrid substances, the stomach pump will often be necessary to adequately cleanse its cavity.

Another method of employing the syphon tube, devised by Rosenthal, is shown in the accompanying illustration (Fig. 6).

To the outer end of the stomach tube is fixed a Y-shaped glass tube, one branch of which is connected with an elastic tube running to an irrigator containing the fluid to be introduced into the stomach, and standing at some height above the patient's head; the other branch is connected with the outflow tube, which descends to a suitable receptacle. Fluid runs into the stomach through the tube connected with the irrigator, the outflow tube being compressed by the fingers of the left hand. If the outflow tube be kept open while the fluid is flowing from the irrigator, and if then, after the establishment of a column of water in the outflow tube, the irrigating tube be compressed with the fingers of the right hand, or its stop-cock closed, a syphon communicating with the stomach is formed, and empties this organ of its fluid contents.

The results obtained from the application of the method of washing out the stomach vary in different cases. In some immediate relief and ultimate cure

are observed; in others we find more or less speedy relief and apparent cure, but frequent relapses, requiring reapplication of the treatment; there are other cases in which recovery is slow and gradual,

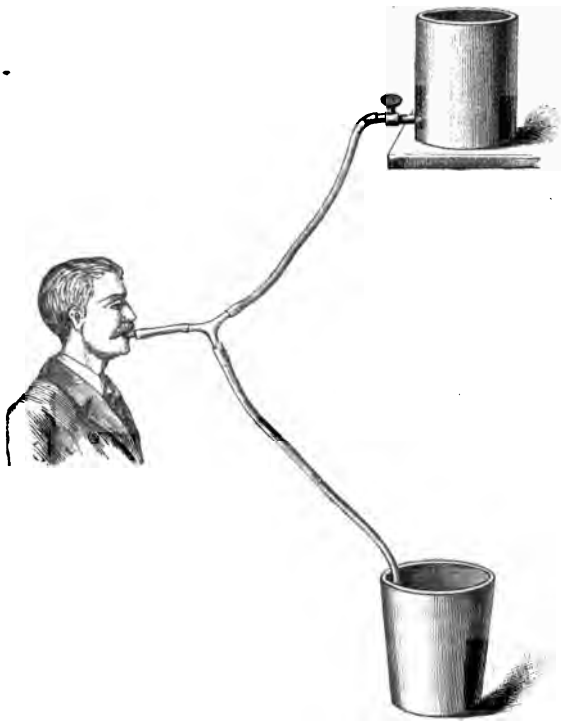


Fig. 6.—Stomach Tube and Irrigator.

and the treatment necessarily prolonged and tedious; others in which benefit attends the application of the method, but it has to be continued for the remainder of the patient's life; and others in which no benefit is obtained.

It must also be borne in mind that there are certain cases in which the use of the stomach tube is **counter-indicated**—for instance, when the attempt to introduce it causes so much pharyngeal spasm or distress from nausea and vomiting as to be seriously injurious to the patient; the existence of great debility; the recent occurrence of hæmorrhage from the stomach; most cases of gastric ulcer; cancer of the cardiac orifice, or of the œsophagus, and aneurism of the aorta. In all these circumstances we must have recourse to those other methods of treatment already detailed.

It has also been objected that lavage is not indicated in simple atrophy—as in that case there is no obstruction to the outflow, but only a lowering of peristalsis, which is not markedly benefited by lavage.

It has been said that it is "highly probable that nearly every case of extreme dilatation of the stomach has some mechanical explanation, and can only be efficiently treated by surgical means."* We must therefore in conclusion consider, very briefly, the **surgical** measures that have been proposed for the relief of this condition.

If the dilatation is dependent on *adhesions* around the pylorus of a simple kind and such as can be detached—and this, of course, can only be determined by an exploratory operation—the setting free of the pylorus by their detachment may effect a cure.

If, however, an exploratory operation discloses the fact that there is pyloric *stenosis*, this may be dealt with according to the nature of the stricture.

Loreta's operation of *forcible dilatation* of the pylorus in cases of spasm, or hypertrophy of the circular muscular fibres, although it appears to have succeeded well in his hands, has not been so favourably regarded by English surgeons, and Mayo Robson "decidedly" prefers "pyloroplasty where no active

* Mayo Robson, "The Surgery of the Stomach," *Lancet*, March 17th, 1900, p. 755.

ulceration is going on, and gastro-enterostomy where the pylorus is ulcerated."

Pyloroplasty consists in dividing the narrowed pylorus longitudinally and closing the wound transversely. Mayo Robson uses a decalsified bone-bobbin, which seems to facilitate the operation, and serves to maintain an open channel. In cases of "bad organic stricture" this authority advises pyloroplasty together with "partial excision."

If the surgeon should find "firm adhesions, active ulceration, and the presence of new growth," gastro-enterostomy may be the better operation.

In some cases of stenosis from malignant growth, "if the growth be limited and there is no secondary infection," pylorectomy may be indicated.

Sir W. Bennett believes that in many cases of gastric dilatation this condition is due to *spasmodic* contraction of the pyloric sphincter, and that the appropriate treatment is to open the stomach on the cardiac side of the pylorus and forcibly stretch the contracted sphincter "until it will allow two or three fingers to lie loosely in it." This measure, he thinks, "should be adopted before the stomach walls have undergone degenerative changes which may render their return to a healthy state impossible."*

As to the value of the operations of *gastrorrhaphy* or *gastro-plication* employed for the reduction of a dilated stomach to something like its normal capacity, there has not been, up to the present, sufficient experience in this country to justify the expression of a positive opinion. Mayo Robson and Moynihan think the "reports show that the operation is a most beneficial one if the cases be well selected."†

Paul Cohnheim has recently reported a series of observations and experiments to the effect that a number of cases of pyloric stenosis and consequent gastrectasia can be relieved by means of large doses

* *Brit. Med. Journal*, February 3rd, 1900.

† "Diseases of the Stomach and their Surgical Treatment," p. 218.

of olive oil. The cases suited to this cure are those of spasm following ulcer or fissure and cicatricial cases. The oil is given at the temperature of the body through a tube, either in doses of 50 c.c. an hour before meals, or in one dose daily of 100 to 150 c.c. He infers that the resistance caused by friction is lessened by the mechanical effort of the oil—that it causes relaxation of spasm and improves nutrition, being absorbed when it reaches the small intestine.

In cases of ulceration the oil acts on the spasm as a narcotic. It does not relieve purely nervous cramp.

He maintains that this method of administering olive oil will, in many cases, render surgical interference superfluous.

We would point out that the patient after taking those large doses of oil should be directed to lie on his right side to favour its outflow from the stomach through the pylorus.

ADDITIONAL FORMULÆ.

For distension and discomfort in early gastric dilatation.

℞ Sodii sulpho-carbolici, gr. v. ad x.
Sodii bicarbonatis, gr. xv.
Sp. ammon. arom., ʒss.
Tincturæ gentianæ co., ʒss.
Aquæ chloroformi ad ʒj.
M. f. haust. To be taken an hour or two after meals.
(*Broadbent.*)

Morning draught in the same cases.

℞ Sodii phosphatis, ʒj ad ʒij.
Succi taraxaci, ʒj ad ʒij.
Aquæ ad ʒj.
M. f. haust. To be taken in hot water early in the morning.
(*Broadbent.*)

CHAPTER VI.

DISEASES OF THE STOMACH — THE TREATMENT OF HÆMATEMESIS, VOMITING, AND GASTRALGIA.

HÆMATEMESIS—Causes—Symptoms—Diagnosis—Indications for Treatment—Prophylaxis—Ergotin—Styptics—Supra-renal Extract—Gelatine Solution—Local Applications—Aperients—Tonics. VOMITING—Its Nature—Prevention—Pathology of Gastric Irritability—Treatment—Sedatives—Counter-irritation—Anti-fermentives—Sea-Sickness. GASTRALGIA, OR GASTRIC NEUROSIS—Its Causes, Diagnosis, and Symptoms—Indications for Treatment—Anæmic, Malarial, Hysterical and Gouty Forms—Treatment of Paroxysm. Additional Formulæ.

HÆMATEMESIS.

IN considering the treatment of gastric ulcer and gastric cancer we have had to remark the frequent occurrence of hæmorrhage from the stomach in these diseases. There are many other conditions which may cause the effusion of blood into the cavity of the stomach, and it is the occurrence and treatment of gastric hæmorrhage from these other conditions, and in a *general* sense, that must now occupy our attention.

One of the most common causes of escape of blood into the stomach is *venous congestion* of its mucous membrane from obstruction to the circulation through the liver, especially from cirrhosis of that organ leading to compression of the branches of the portal vein. Any other obstruction to the circulation in the portal vein will produce a like effect; such as obstruction to the outflow of bile from closure or stricture of the hepatic or common bile duct; the bile ducts then become distended, and compress the branches of the portal vein in the liver. Thrombosis of the portal vein would also have the same effect, and so, of course, would pressure upon it from a tumour of any kind in the transverse fissure of the liver.

Diseases which lead to the plugging or destruction of the capillaries of the liver, such, for instance, as acute yellow atrophy, may also cause congestion of and hæmorrhage from the gastric mucous membrane.

Increased pressure in the portal system from arrest of a regularly recurring hæmorrhoidal flux is sometimes attended with hæmatemesis.

Obstruction to the circulation through the heart and lungs, as in valvular cardiac disease and in pulmonary emphysema, may less directly, through the hepatic veins, tend to hæmorrhage from venous congestion of the stomach.

Hæmorrhage into the stomach may occur from disease of the coats of its vessels, atheroma, varix or aneurism, or from a *morbid permeability* of the vascular walls, together with a morbid state of the blood, as in the so-called hæmorrhagic diathesis (*hæmophilia*), in malaria, in scurvy, in yellow fever, and some other affections, or the bleeding vessel may be at the lower part of the œsophagus, from the existence of a dilated and varicose condition of the veins there, a not uncommon development in hepatic cirrhosis, by means of which a collateral circulation is established, allowing the blood from the portal vein to reach the heart without passing through the liver; and the blood thus extravasated may flow into the stomach and accumulate there; or it may flow back into the stomach from the duodenum; or an aneurism of an adjacent artery may rupture into the stomach.

We have seen how hæmorrhage into the stomach may be produced by erosion of its vessels from simple or cancerous ulceration; and erosion from the entrance of corrosive substances, or rupture of vessels from mechanical injury, will, of course, be attended with the same results. Violent acts of vomiting sometimes lead to hæmorrhage. In some cases of severe and fatal hæmorrhage from the stomach it has been found impossible, on *post-*

mortem examination, to discover the source of the bleeding; it must have been wholly capillary and congestive.

Some of these mysterious cases of capillary hæmorrhage have been found to occur after certain surgical operations—especially operations connected with the abdominal cavity and the omentum. Mayo Robson remarks that these cases are "neither well recognised nor well understood," yet they are "often serious and at times fatal."*

In the female sex, the occurrence of the menopause and of menstrual irregularities seems to exert an important influence on the frequency of the occurrence of gastric hæmorrhage.

The **symptoms** which reveal the occurrence of hæmorrhage into the stomach are the following: in the first place, there is usually *vomiting* of blood, but this symptom may be absent, and a small quantity of blood extravasated into the stomach may pass away by the bowels; when a large quantity of blood has been rapidly poured out, certain symptoms may precede the actual vomiting of blood, such as a sense of weight, fulness, and warmth in the epigastrium, accompanied by nausea, an unpleasant, sweetish taste in the mouth, and a feeling as of fluid rising in the œsophagus. As the hæmorrhage goes on the patient becomes pale, and complains of giddiness and faintness, of noises in the ears, and sparks of light in the eyes. The pulse is small and rapid, and the skin cold.

These symptoms may, however, be absent in smaller hæmorrhages and in robust persons. The blood vomited passes through the mouth, and sometimes through the nose, and is partly fluid, partly clotted; a portion may enter the larynx and excite coughing, and this must be borne in mind when the hæmorrhage is said to have been attended by coughing. There are occasionally cases of large hæmorrhage in

* Hunterian Lectures on "The Surgery of the Stomach," *Lancet*, March 10th, 1900, p. 679.

which the blood is retained in the stomach and not vomited, and percussion over that organ shows that it is distended and dull from the presence of blood clot, while the general symptoms of severe internal hæmorrhage are present, such as pallor and coldness of the surface, collapse, pulselessness, tremors, and convulsions. Sooner or later, after the hæmorrhage, blood appears in the motions, usually in the form of a black, tar-like substance.

The appearances presented by the blood vomited depend on the time it has been detained in the stomach. If vomiting occurs at once, the blood may be of a bright red colour and entirely fluid, but more commonly it is partly coagulated, and has the appearance of coffee-grounds or of soot mixed with water, the change in colour being due to the action of the gastric juice on the hæmoglobin. Sometimes portions of food, bile, and mucus may be mixed with the altered blood.

The usual symptoms of anæmia follow the loss of blood if it has been large: great pallor, coldness of the extremities, giddiness and faintness, spots before the eyes, and other affections of vision.

The alarming symptoms of gastric hæmorrhage usually pass away, and the patient recovers; and in cases of cirrhosis of the liver, some of the symptoms of the original disease have, occasionally, been ameliorated by its occurrence.

But if it recurs, as it is prone to do, frequently and in large amount, the patient must, of course, ultimately sink from exhaustion, if he does not die suddenly during an attack.

A few considerations as to **diagnosis** are necessary before we enter upon the discussion of the treatment applicable to those cases. There is usually little difficulty in deciding as to the source of the hæmorrhage when we have been familiar for some time with the previous history of the patient. The difficulty arises chiefly in those cases in which a loss of blood occurs suddenly and unexpectedly in a person

who has not been recently under medical supervision.

This may occur sometimes in cases of perforating ulcer of the stomach, or in those cases of hæmorrhage from the stomach or lungs associated with menstrual irregularities; and in cases of early unsuspected phthisis. We must also bear in mind that blood is sometimes intentionally swallowed, and that it may be so, accidentally, when poured out from the mucous membrane of the nose, pharynx, or even the air passages during sleep.

We may conclude that the blood proceeds from the stomach in the following circumstances: The bringing up of the blood is preceded by nausea and an inclination to vomit; it is of dark colour (unless very considerable in quantity, when it may be bright); it is coagulated, contains no air bubbles, may be mixed with food, and has an acid reaction. It is followed by tar-like motions. It is *not* followed by the coughing up of blood-stained expectoration, nor are there any localised moist râles or any area of loss of resonance to be discovered in the lungs.

The indications for treatment in cases of hæmatemesis must necessarily depend on the nature of the original disease of which it is but a symptom. Many of these diseases are incurable, as will be evident in referring to what has been said under the head of causation; and when hæmatemesis occurs in the course of gastric cancer, or of chronic disease of the liver, heart, or lungs, it is only as an incident in the course of these affections that its treatment has to be considered. The treatment appropriate to gastric ulcer generally we have already discussed.

In certain cases the opportunity of applying prophylactic measures may occasionally be afforded; if gastric hæmorrhage tends to occur at the menstrual period, a few leeches may be applied to the cervix uteri at the time the attack is threatened, and all physical exertion at the approach of and during the catamenial period should be strictly forbidden; if it

is known to be dependent on hepatic cirrhosis, leeches may, in like manner, be applied to the anus so as to withdraw blood from the hæmorrhoidal veins; in chlorotic and scorbutic persons the general health should be strengthened by iron tonics and a hygienic regimen; and certain periodically returning attacks associated with malaria have been permanently arrested by the administration of quinine.

When hæmorrhage has actually occurred, the paramount indication is to diminish vascular pressure so far as possible. Fortunately, the escape of blood itself tends to do this, especially when it causes syncope, so that it has become an axiom that hæmorrhage tends to cure itself. In order, then, to quiet the action of the heart as much as possible, the most complete rest in the recumbent or semi-recumbent position should be insisted upon and maintained. If the patient should have fainted on the occurrence of the hæmorrhage, he should not be moved, but treated where he is found, so that absolute rest may be maintained, at any rate, for some hours. The patient's anxiety should be calmed, and his room kept cool and quiet. No food should be given by the stomach for some days, that organ being kept quite at rest so as to avoid the risk of dislodging the fibrinous plugs in the bleeding vessels. Such nutriment as is needed must be administered by the rectum.

A hypodermic injection of morphine or a small opiate enema should be at once given; it lowers vascular tension, soothes the patient, and contributes to mental and bodily rest.

But what means are there at our disposal for arresting the bleeding when it continues or recurs at short intervals?

Much difference of opinion exists as to the value of the hypodermic injections of *ergotin* in arresting gastric hæmorrhage. Dreschfeld and Leech of Manchester both think they may do good, and with this view our own experience accords. We certainly

cannot adopt the very adverse views expressed by Professor Walter Smith on the use of this drug.* They seem to us inconsistent with the *best clinical* testimony.

The French physicians mostly prescribe the *ergotinine* of Tauret—he makes a clear unirritating solution well adapted for hypodermic use. This is the preparation we have used, and we think with good results. From 15 to 20 minims is the dose.

The so-called *styptics*, ferric perchloride, lead acetate, tannin, alum, turpentine, can be of little or no use when the stomach is partly filled with blood and half-digested food, as they could not then come into contact with the bleeding mucous membrane; but they may be of value in arresting the oozing of blood from the surface of the stomach after its contents have been removed by vomiting.

Alum and sulphuric acid, 5 grains of alum and 20 minims of dilute sulphuric acid in an ounce of iced water, may be given in quickly repeated doses in cases where we have reason to think there is continued oozing of blood into the stomach; or we may give 20 minims of solution of perchloride of iron in an ounce of iced water for the same purpose. We have seen remarkable benefit from the use of ferric perchloride in cases of recurrent hæmatemesis.

The following mixture may be found valuable where there is much gastric irritability with continuous oozing of blood :—

℞ Plumbi acetatis ʒss.
Acidi acetici diluti ʒjss.
Liquoris opii sedativi ʒss.
Aquæ caryophylli ad ʒvj.
Misce, fiat mistura. A tablespoonful every hour.

The administration of *supra-renal extract* has been advocated in these cases, but there is very little reliable clinical evidence in its support.

* *Brit. Med. Journal*, October 13th, 1900, p. 1,070.

The same may be said of the *subcutaneous injection of gelatine* dissolved in normal salt solution (containing 2 per cent. of gelatine). One of the recent advocates of its use * bases his recommendations on trials in which he "found it advisable to combine the gelatine treatment with morphine and acetate of lead or ergot." We fail to see how, when such a mixture is used, it is possible to conclude what precise share in the result is rightly attributable to any one of them. Such observations seem to us useless in estimating the value of a new remedy. But the subcutaneous injection of solutions of gelatine has disagreeable bye-effects, such as pain at the seat of injection, fever, urticaria, etc., and fatal results have followed its use in several instances. It is a method of treatment which we are not disposed, at present, to recommend.

The local application of cold is usually an efficacious remedy. Ice pounded and mixed with bread crumbs may be applied to the epigastrium in the form of a poultice; small fragments of ice should be frequently swallowed; this also relieves the thirst and checks the tendency to vomiting.

The *syncope* may be relieved by the horizontal position, the head being kept low. Smelling salts may be applied to the nostrils, and cold water sprinkled on the face, and the temples bathed with eau de Cologne. When the syncope is dangerous, one of the best measures to have recourse to is the hypodermic injection of ether, 20 or 30 minims at a time, repeated at short intervals; or strychnine and ether combined may be used.

Giving stimulants by the stomach should, if possible, be avoided.

In cases where life is endangered by the profuseness of the hæmorrhage, the hypodermic injection of artificial serum (2 to 6 oz.) may be advisable.

If there is a troublesome tendency to vomit, sinapisms may be applied to the epigastrium, and 3 or

* Grunow, *Berl. Klin. Woch.*, August 12th, 1901.

4 minims of dilute hydrocyanic acid in a tablespoonful of iced water may be given every hour or two for four or five times. A small quantity of iced champagne is occasionally useful in checking the vomiting.

In those remarkable and ill-understood cases mentioned by Mayo Robson of capillary hæmorrhage from the stomach following certain operations, he advises free purgation by calomel and wholly rectal alimentation.

In cases of cirrhosis of the liver the *after treatment, i.e.* after the hæmorrhage has ceased, should include the daily use of an aperient composed of the alkaline sulphates; this will tend to relieve, or prevent, engorgement of the portal system.

℞ Sodii sulphatis ʒj ad ʒij.
Magnesii sulphatis ʒss ad ʒj.
Aquæ cinnamomi ʒjss.
Misce, fiat haustus. To be taken early in the morning.

The resumption of feeding by the stomach must be attempted with great caution, and nothing but fluid and non-irritating foods administered for some considerable time.

Restorative blood tonics will be needed in many cases to remove the anæmic condition consequent on the loss of blood.

VOMITING.

Vomiting is, as we have seen, a symptom common, at some time or other, to most diseases of the stomach, and it occurs also in a number of other diseases, *e.g.* in whooping cough, in phthisis, in renal disease, in uterine and ovarian disease, in meningitis, in hysteria, etc. etc., and its appropriate treatment as a symptom of these several maladies must necessarily be considered when we discuss the treatment of these diseases themselves, for it would serve no good purpose to discuss the treatment of vomiting, which occurs as a symptom of these diseases, apart from the consideration of the treatment of these diseases

themselves. But vomiting also not unfrequently occurs as a morbid phenomenon occupying by itself almost the whole of the stage, so to speak; as, for instance, in sea-sickness; and it will be convenient and profitable here to consider briefly its treatment in a general sense, and as it occurs unconnected with any definite pathological lesion.

The **act of vomiting**, whether the irritation causing it be central or peripheral, consists, we believe, at first in contraction of the muscular walls of the stomach itself, the pyloric orifice being usually spasmodically closed; and secondly, the irritation is communicated reflexly to the diaphragm and the muscles of the abdomen, which, by their contraction, powerfully aid the expulsive efforts of the stomach, and its contents are thus more or less violently ejected.

Threatened vomiting from irritating ingesta can often be prevented by simply diluting the irritating contents of the stomach with water, when there is no actual disease of the stomach present. In such cases certain kinds of food or drink, accidentally or incautiously taken, remain in the stomach an unusually long time, and provoke a great amount of *acid* fermentation. Under the circumstances the pylorus contracts spasmodically so as to prevent the passage into the small intestine of this highly acid or imperfectly formed chyme; two or three glasses of pure water, or, better still, water containing 10 or 15 grains of sodium bicarbonate in each glass, will entirely remove the tendency to vomit in such cases, and it would seem that when this excessive acidity of the gastric contents is diluted, or neutralised, the pylorus relaxes, and allows the contents of the stomach to pass on into the small intestine.

Care and observation in diet will usually suffice to cure this tendency to vomit, which is dependent on an abnormal irritability of the stomach to certain ingesta. Iced drinks and effervescing alkaline waters are often of much use in such cases, and in extreme

instances complete abstinence from food and repose of the stomach for a short time may be advisable.

In cases of simple gastric irritability the food may be limited to a mixture of milk, ice, and Apollinaris or Vichy water for a time; and this should be sucked through a straw or a glass pipette; in addition, an ordinary effervescing mixture, with excess of alkali, may be prescribed.

We have found 20 grains of sodium bromide dissolved in an ounce and a half of dill-water taken an hour before a meal check or arrest the tendency to irritative vomiting in some neurotic persons. Feeding by the rectum is not very successful in these cases of gastric irritability occurring in nervous persons, as the repeated efforts at vomiting are often attended by involuntary expulsion of the nutrient enemata.

The pathology of these states of temporary or recurring gastric irritability, in the absence of any disease, is somewhat obscure,* but they are probably, in many instances, states of **hyperæsthesia** of the gastric mucous membrane analogous to those forms of cutaneous hyperæsthesia which occur in localised areas of skin in some hysterical persons, or to those cases of irritability of the vesical mucous membrane, with frequent micturition, which we often encounter. But this condition of stomach calls much more urgently for treatment than those other hyperæsthetic states to which we have alluded, for in the latter the nutrition and general health of the patient are not endangered as they are in the former. It is, therefore, not only justifiable, but necessary, to apply anæsthetic remedies freely in those cases until the irritability of the gastric mucous membrane is overcome. It may be necessary to have recourse to opiate and belladonna suppositories or to hypodermic

* Some authors make a more or less artificial classification of some of these forms of vomiting, as "nervous vomiting," "reflex vomiting," "juvenile vomiting," "idiopathic nervous vomiting," "periodic vomiting," etc. These are of little value from the point of view of treatment. *Vide* Max Einhorn and Hemmeter, "Diseases of the Stomach."

injections of morphine and atropine, or to the internal administration of cocaine, chloroform water, or other sedatives.

Before, however, resorting to these, we should try the effect of more simple measures. Lime water has often a remarkably sedative effect on the gastric mucous membrane, and we should never omit the trial of tablespoonful doses of lime water every hour or two. Cherry-laurel water or hydrocyanic acid is also most useful, and the latter would succeed more frequently than it does were an adequate dose given. In cases of extreme irritability we should begin by giving 3-minim doses of the dilute hydrocyanic acid of the B.P., and increase the dose to 6 or 8 minims, watching carefully the effect of the remedy. We have known larger doses than this given with remarkable success; but such large doses of a poisonous agent must only be given by, or in the presence of, a medical man.

Mustard plasters or blisters to the epigastrium or opium plasters have been advocated, and are all worthy of trial in troublesome cases.

Another remedy which will succeed in arresting vomiting in some cases is creasote water, or creasote and lime water—a minim of creasote shaken up with an ounce of lime water; or the creasote may be given in the form of pills made with powdered soap.

Carbolic acid and its derivative, *resorcin*, have both been warmly advocated as remedies for vomiting, and they act, doubtless, in the same way as creasote; the former may be given in 2-grain doses frequently repeated, made into a pill with liquorice powder; and *resorcin* in 5-grain doses, well diluted with water and flavoured with syrup of orange-peel. It is said to be valuable in sea-sickness. *Menthol* is also useful; it can be prescribed in the form of tablets, each of $\frac{1}{10}$th of a grain, combined with chocolate. Two of these may be taken frequently. These remedies all possess marked anti-parasitic and

anti-fermentative properties, and they are also powerful sedatives.

Creasote and carbolic acid have been prescribed in the following forms for the relief of vomiting:—

℞ Creasoti ♏x.
Acidi acetici ♏xx.
Morphinæ sulphatis gr. ss.
Aquæ ad ℥j.

Misce, fiat mistura. A teaspoonful every half hour for three or four doses.

℞ Acidi carbolici gr. j.
Chloroformi ♏iv.
Spiritus vini rectificati ℥ss.
Aquæ ad ℥j.

Misce, fiat mistura. Half to be taken immediately and repeated in half an hour.

Many of the remedies we have here indicated are efficacious in checking the symptomatic vomiting of cerebral, renal, and other maladies.

Max Einhorn states that he has seen many cases of "nervous vomiting," which have continued for many years in spite of various modes of treatment, "perfectly cured by the faradic current."*

We may now refer especially to two forms of sickness which we shall have no other opportunity of alluding to, namely, sea-sickness and the vomiting of pregnancy.

And first, with regard to **sea-sickness.** We doubt if anything can prevent sea-sickness (except in *short* voyages) in certain persons and in certain circumstances, but we are satisfied that much of the distressing nausea and retching which follow the first or second act of vomiting can be, in most persons, effectually relieved, the indication being, *after* the stomach has been evacuated, to allay the hyperæsthesia of the gastric mucous membrane.

It is undoubtedly of great importance to follow a careful and simple diet for a week or two before undertaking a sea voyage, and to take two or three

* "Diseases of Stomach" (second edition), p. 444.

doses of aperient medicine during the same period before embarking.

For voyages of five to ten hours, immunity from sickness may be obtained by taking a sufficient dose of chloral and ammonium bromide to procure five to ten hours' sleep; 30 grains of each of these in an ounce of chloroform water should be taken half an hour before the vessel starts, in which a comfortable sleeping berth should be secured. Certain persons have a tendency to vomit even in taking long railway journeys; potassium bromide will often prevent this tendency.

In short but stormy passages we have found the following draught very useful, and although it may fail to prevent the first act of vomiting and the discharge of the contents of the stomach, it has had the effect of taking away much of the distress of this vomiting, and has proved of great value in preventing further nausea and retching. This draught consists of half a grain of cocaine hydrochloride, 20 minims of chloroform, and a dram of compound tincture of cardamoms, mixed with an ounce and a half of water. It should be given as soon as any serious nausea is felt, and although it will not probably, as we have said, prevent the first act of vomiting, it will, if another dose be taken immediately after this, prevent in many persons a recurrence of the sickness.

There is a considerable amount of evidence in favour of the usefulness of chloral in combating sea-sickness. Dr. Giraldes and Dr. Obet, both quoted by Dujardin-Beaumetz,* bear testimony to its success —the former in his own person in short passages across the English Channel, and the other in his practice as physician to the Transatlantic Company— in doses of 15 to 45 grains—*iced champagne* being given at the same time to allay thirst.

In those exceptionally grave cases in which the vomiting persists in spite of chloral and other measures,

* "Leçons de Clinique Thérapeutique," vol. i., p. 460.

we should not hesitate in the free use of morphine and atropine, injected hypodermically; it is only by such means that the risk of fatal exhaustion can be averted. We should begin with a quarter of a grain of morphine and $\frac{1}{120}$ grain of atropine, and, if necessary, increase the morphine to doses of half, three-quarters, or even a whole grain. Iced champagne or brandy and soda-water should be given if it can be retained; if not, it is advisable during the continuance of the morphine sleep to administer enemata of milk and brandy or beef-tea and brandy.

There are, however, some persons in whom morphine itself excites troublesome vomiting as well as great cardiac depression, and in such cases we must avoid this drug and have recourse to *cocaine* or *chloroform*. One or two drops of the latter on a lump of sugar, or in a wine-glass of iced soda water, may be given every fifteen minutes until relieved; or a solution of hydrochloride of cocaine in the proportion of 1 grain to the ounce may be given cautiously in doses of one or two teaspoonfuls every hour or two.

A tightly applied abdominal belt has been advocated as a useful preventive to sea-sickness, but it has proved of little remedial efficacy in severe cases and on long voyages.

Ammonium bromide is regarded by some ship surgeons as the best of all remedies. It should be begun a day or two before embarking; a dose of 20 grains in an ounce of chloroform water with 15 grains of sodium bicarbonate twice or three times a day. It will remove acidity and promote gastric anæsthesia.

Chlorobrom, which is a mixture of chloralamide and potassium bromide, 30 grains of each to the ounce, flavoured and coloured, has been found of value in the treatment of this malady. The dose is two to four drams, repeated if necessary.

Other remedies that have been suggested are the application of an ice-bag to the spine, and drop

doses of tincture of iodine in a teaspoonful of water every half hour. *Resorcin* in 5 to 10-grain doses, and amyl nitrite in doses of ½ a minim, dissolved in 20 drops of spirit of wine, and mixed with a teaspoonful of water, every hour.

Oxalate of cerium will, occasionally, succeed in allaying vomiting after other remedies have failed; 2 to 3 grains should be given, mixed with a little powdered sugar, every two or three hours. This is, however, usually found of most value in the next form of vomiting to be considered, viz. that dependent upon **utero-gestation.** This is a form of vomiting often excessively troublesome to arrest, and in extreme cases can only be relieved by dilatation of the cervix uteri, or by removing the uterine contents. In some cases a small enema consisting of 20 minims of liquor opii sedativus and 30 grains of potassium bromide in 2 ounces of water has been found very valuable; or 15 grains of sodium bromide in a tablespoonful of lime water may be given by the mouth twice a day. The stronger alcoholic liqueurs are often useful in these cases, and small quantities of rum, cognac, Chartreuse or Kirsch may be given, dropped on a lump of sugar from time to time. Large doses of pepsin, 7 to 8 grains, have been advocated as of great service. The late Professor Laségue was a firm believer in the efficacy of tincture of iodine in such cases, given in 5- to 10-drop doses with syrup and water.

Creasote is sometimes very useful in arresting this, as well as other forms of vomiting; so also is *menthol.* Fifteen grains are dissolved in five drams of alcohol, and an ounce of syrup is added. A teaspoonful of this mixture is given every hour.

Hemmeter recommends the following mixture:—

℞	Cerii oxalatis	gr. lx.
	Cocainæ hydrochloridi	gr. iii.
	Menthol	gr. xii.
	Bismuthi salicylatis	ʒi.
	Elixir simplicis	qs. ad ʒvj.

M. fiat mistura. A tablespoonful on an empty stomach four times daily.

Engelmann has recorded a case in which the exhaustion and emaciation were extreme, and in which he prescribed ten drops of a 10 per cent. solution of cocaine three times a day. After the first dose water was retained in the stomach, and the following day the patient was able to keep down a cup of coffee, and subsequently some soup. Two days afterwards the dose was diminished, and the treatment was soon discontinued without any return of the vomiting. In this case all the other remedies tried had failed.

Cocaine has also been given hypodermically in these cases with success—$\frac{1}{6}$th of a grain just before taking food twice or thrice daily.

Ingluvin has been found by Papp to arrest this form of vomiting. He gave four grains half an hour before food, and two tablespoonfuls of a 1 per cent. dilution of hydrochloric acid immediately after food.

Frommel has obtained very good results from basic *orexin.**

Lublesky, of Warsaw, and some other foreign physicians have strongly advised the use of the *ether spray*, applied to the epigastrium by means of a Richardson's pulveriser for three or four minutes at a time, before the patient attempts to take food. Injections of chloral, inhalations of oxygen, feeding by means of the syphon tube, and various other expedients have been advocated for the relief of this troublesome symptom. Sometimes quite simple measures are sufficient to afford relief, *e.g.* a tablespoonful or two of lime water every two or three hours, alone or with an equal quantity of milk; or a simple effervescing mixture, with 3 to 5 minims of dilute hydrocyanic acid in each dose; or 2 or 3 minims of liquor opii sedativus with a few grains of sodium bicarbonate in two tablespoonfuls of hot water half an hour before attempting to take food.

Ringer advocates minim doses of ipecacuanha wine, with or without small doses of nux vomica, to

* Hemmeter, "Diseases of the Stomach," p. 634.

be given every hour for this and other kinds of vomiting. This should certainly be tried, but we have not found it at all so efficacious as Ringer has.

Chloretone, recently introduced as a hypnotic, has been reported to possess anæsthetic properties analogous to those of cocaine, and to have been found of value in the relief of vomiting of gastric origin, including sea-sickness and the vomiting of pregnancy. The dose is 3 to 5 grains, in tablets or capsules.

Dr. Kenny, of Tallow,* has stated that he has found the application of a blister 1½ inch long and half an inch wide over the pneumogastric nerves at the anterior border of the sternomastoid, relieve permanently most distressing vomiting occurring during and after delivery, when the usual drugs had been given without any result.

Mitchell † states that he has succeeded in controlling the most persistent vomiting by applying towels wrung out in ice-cold water and changed every minute till the vomiting has ceased.

The cases of "*Periodical Vomiting*," described by Leyden, seem to us to have a close relationship with those cases which we term "sick headaches" in this country. Their periodical recurrence, without any warning, when the patient may be in good health, the circulatory depression, the intense headache, the acid vomiting, the loss of appetite, the tendency to recur for many years, compose a pathological picture very familiar to English physicians.

GASTRALGIA, GASTRODYNIA, SPASM OR CRAMP OF THE STOMACH.

These several designations are applied to certain painful conditions of the stomach referrible to an affection of the gastric nerves—the pneumogastric or the sympathetic—and independent of structural disease or functional alteration of its muscular or mucous structures. Whether dependent on local irritation,

* *British Medical Journal*, January 2nd, 1892
† *Practitioner*, February, 1900, p. 238.

immediate or remote, or general constitutional states, these conditions must be considered as neuralgic, and their treatment must be guided to some extent by the same principles as determine the treatment of other painful **neuroses.**

These painful affections of the stomach are often associated with anæmia, chlorosis, and other debilitating influences, and would appear in such cases to be due mainly to an impoverished state of the blood. In hysterical cases, and especially in those connected with organic or functional disorder of the female sexual organs, attacks of gastralgia are exceedingly common, and they are apt then to occur exclusively, or with especial severity, at the menstrual periods. So also in diseases of the abdominal viscera, *gastralgia* may be excited by irritation conveyed along the branches of the sympathetic. It may occur in those morbid states of the blood determined by malaria, by rheumatism, gout, and by other dyscrasiæ.

Attacks of gastralgia may also be of central origin, and depend on disease of the gastric nerves at their source, or in their course before they reach the stomach, as from thickening of their sheaths, or from the pressure of tumours upon them, such as aneurisms, etc.

It is obvious that the cause of such attacks must occasionally be obscure, and difficult of discovery. When attacks of gastralgia are induced by certain ingesta which would not cause pain under normal conditions, we must regard the attacks as due, to some extent, to a morbid hyperæsthetic state of the extremities of the gastric nerves.

Gastralgia, like other neuralgias, is apt to occur in any circumstances which lead to general malnutrition, and especially to those which produce exhaustion of the nervous system, so that masturbation and sexual excesses must be included amongst its causes. Excessive use of tobacco has also been stated to be a cause of this affection.

The successful *treatment* of gastralgia will depend, in the first place, on one's ability to distinguish it from other morbid states giving rise to pains in the region of the stomach; we must, therefore, consider briefly the characteristic **symptoms** of gastralgia.

The pain in this affection is apt to come on suddenly, and in paroxysms, and then to pass away completely for a time. In some cases the pain is very violent. "Severe griping pains in the pit of the stomach, usually spreading into the back, faintness, shrunken countenance, cold hands and feet, and small intermittent pulse. The epigastrium is either puffed out like a ball, or, as is more frequently the case, retracted, with tension of the abdominal walls. There is often pulsation in the epigastrium. External pressure is well borne (unlike the pain of ulcer and cancer), and not unfrequently the patient presses the pit of the stomach against some firm substance, or compresses it with his hands. . . . The attack lasts from a few minutes to half an hour; then the pain gradually subsides, leaving the patient much exhausted, or else it ceases suddenly with eructations of gas or watery fluid, with vomiting, with gentle perspiration, or with the passage of pale or reddish urine."* There is sometimes a craving for food, and the pain is relieved by taking food—a circumstance which also differentiates this disease from most other morbid states of the stomach. Complete loss of appetite is, however, not uncommon. More or less long intervals between the attacks also serve to distinguish it from the more or less continuous pain of cancer and other affections. When due to malarial causes the attacks may be periodic.

One of the most important considerations is to recognise and distinguish the less severe forms of gastralgia occurring in chlorotic girls from gastric ulcer, which is also so frequently found to exist in such patients. The pain of gastric ulcer is usually

* Romberg.

aggravated, and not relieved, by taking food; and a careful diet or complete abstinence will be attended with the best results. Abstinence will, however, often aggravate the gastralgia of chlorosis. The occurrence of *left-sided* pain is exceedingly common in chlorotic and hysterical girls, and it is sometimes referred to the gastric and sometimes to the cardiac regions, and sometimes more vaguely to the left side generally. It is often very difficult to determine the nature of this left-sided pain; in some cases it is doubtless gastralgic, in others it is dependent on neuralgia of the lower intercostal nerves, as may be detected by pressure over the lower interspaces; in others it would seem to be actually *cardialgic*, and dependent on a hypersensitive state of the cardiac muscle, as pressure with the tip of the finger over the cardiac apex is distinctly painful.

It is often difficult at first to distinguish between attacks of *biliary colic* and gastralgia, and when there is no jaundice or other sign of biliary obstruction, we must be guided chiefly by the history and antecedent and concomitant circumstances of the case.

We have also to bear in mind that gastralgia may co-exist with other diseases, organic or functional, of the stomach, or other abdominal viscera. But having satisfied ourselves of the neurosal character of the disease, the question that has here to be discussed is how it can best be relieved or cured.

When we are able to trace the gastralgic attacks to some obvious cause, the **indications for treatment** are direct and clear. If they are found to occur after taking particular articles of food or drink, these must, of course, be eliminated from the dietary. Tea, coffee, tobacco, particular kinds of wine, even milk and eggs, certain kinds of raw fruit and vegetables, some varieties of fish or shell-fish, will induce in certain persons attacks of gastrodynia. In such persons very careful observation should be made of the effects of different articles of food, and a suitable

dietary constructed, from which those which disagree with them are excluded.

In chlorotic and anæmic cases our efforts should be directed to restore a normal condition of blood and nutrition. For this purpose ferruginous and other tonics must be given. Some preparations of iron agree much better with these patients than others. Leube* prefers the *lactate of iron*, or the *ferrum redactum* in 3-grain doses, mixed with some aromatic powder, or with extract of cinchona. He also recommends in such cases 8 drops of dilute hydrochloric acid in a wineglassful of water two hours after food. We have found the following modification of Blaud's pills very useful :—

℞ Ferri sulphatis exsiccatæ gr. ij.
Potassii carbonatis gr. j.
Pulveris nucis vomicæ gr. j.
Mucilaginis quantum sufficiat.
Ut fiat pilula. One three times a day an hour after food.

Another combination we have found useful in these cases is the following :—

℞ Ferri et quininæ citratis gr. x.
Liquoris strychninæ ♏iij.
Acidi hydrochlorici diluti ♏v.
Aquæ chloroformi ad ʒj.
Misce, fiat haustus. To be taken an hour after food three times daily.

Dr. Huchard finds the following pills valuable in these cases :—

℞ Ferri tartarati ʒijss.
Extracti gentianæ ʒij.
Extracti nucis vomicæ } āā grana iv.
Extracti opii }
Misce, et divide in pilulas numero centum. Two to be taken immediately before each meal.

Ewald prefers an albuminate of iron which he roughly prepares by adding the solution of perchloride

* Ziemssen's "Cyclopædia of the Practice of Medicine," vol. vii., p. 306.

of iron to a mixture of egg albumen and water 1 to 5.

The saccharated carbonate of iron is a mild and easily-digested form of iron, and can be given in a powder of 5 to 10 grains after meals three times a day.

Strychnine has been found curative in some instances. From $\frac{1}{80}$th to $\frac{1}{60}$th of a grain may be given hypodermically; or three minims of the liquor strychnine in a tablespoonful of chloroform water may be given twice or three times a day, an hour before food.

In anæmic cases which fail to benefit by the pharmaceutical preparations of iron, it may be advantageous to prescribe a course of iron water at Spa, Schwalbach, Pyrmont, or St. Moritz.

When masturbation is the cause, Leube advises cold frictions of the whole body and removal to the sea-side for sea-baths, or to St. Moritz for its mountain air and iron springs.

Cases having a **malarial** origin must be treated with quinine or arsenic. Quinine must be given in adequate doses—5 to 10 grains dissolved in lemon juice three times a day; if quinine is not well borne or fails to relieve, arsenic should be given—3 or 4 minims of the liquor arsenicalis after meals three times a day. Or it is sometimes better to give a *small* dose of arsenic, one minim of Fowler's solution, in water, immediately before meals, for some considerable time; and this method is applicable to other than malarial cases.

The purely **hysterical** forms are often very difficult to relieve; the bromides, alone or in combination with valerian and other antispasmodic drugs, should be tried. The *valerianate of zinc* or of iron in grain doses in pills three times a day after food is, perhaps, one of the best remedies in these cases; or 10 to 15 grains of bromide of sodium or ammonium in an ounce of infusion of valerian with 20 minims of spirit of chloroform, an hour before meals twice or three times a day, may be given; or 5 grains of the pil

asafœtidæ comp. thrice daily. Sea-bathing, if it can be borne, is likely to be of more permanent use than drugs in these cases; or the judicious use of cold compresses or douches in a hydropathic establishment, together with massage, or the application of the constant current; the latter is sometimes very efficacious.

Max Einhorn advocates as especially beneficial the *intraventricular* method of applying this galvanic current. He says, "It rarely fails to relieve the most intense and obstinate cases of idiopathic gastralgia" if applied for a period of from four to six weeks.* Hemmeter also refers to the galvanic current as a most effective remedy. He uses "large felt-covered copper plates dipped in water as hot as the patient can stand, the anode placed on the epigastrium and the cathode on the spinal column extending from the cervical region downward between the scapulæ." For this purpose he uses "very strong currents, not less than 25 milliampères."

If the attacks are dependent on some uterine affection, appropriate local treatment must be instituted.

When they are associated with the gouty or rheumatic state, the constitutional condition on which they depend must be attacked. The gouty attacks will require very careful dieting and eliminative treatment —the free exhibition of draughts of hot water, or, if there is much acidity, warm Vichy water; if there is constipation, warm Carlsbad water, in addition, taken in the morning fasting.

Hot compresses or mustard poultices to the epigastric region, and warm baths, will be useful in both gouty and rheumatic cases.

In the gouty cases attempts to provoke revulsion to the joints may be made by the use of hot foot-baths of mustard and water or mustard poultices to the feet. It is also advisable to give some diffusible stimulant to relieve the sense of general depression and appre-

* "Diseases of Stomach" (second edition), p. 413.

hension which usually accompanies gouty gastralgia, such as the following:—

℞ Ammonii carbonatis gr. v.
Spiritus ætheris compositi... ♏ xx.
Aquæ menthæ piperitæ ℥ss.
Misce, fiat haustus. To be taken every three or four hours until relieved.

Many other remedies have been suggested, such as alum in 15-grain doses three times a day, between meals, potassium iodide, salicin, and sodium salicylate; the last three would certainly merit a trial in rheumatic cases.

Passing now from the fulfilment of the causal indications when these exist, we must consider next the **treatment of the attack** when the cause is unknown, or when the immediate relief of suffering becomes the paramount indication.

In most of these cases, opium or morphine in one or other of its forms will be needed. We should endeavour, however, to use as small doses as possible, and to avoid their frequent repetition; for not only is there the fear of inducing a craving for opium or morphine, and the creation of an opium habit, but these drugs have the great disadvantage of arresting the hepatic and intestinal secretions, and, therefore, of causing constipation, loss of appetite, and sluggish digestion, so that the general nutrition becomes greatly impaired by their frequent use. We must not, however, hesitate to use them for the relief of pain when this is severe and when other means fail. The liquor opii sedativus (*Battley*) is the best form for giving opium in these cases, and it is well to combine it with ammonia and some aromatic, as in the following:—

℞ Liquoris opii sedativi ♏ v ad x.
Spiritus ammoniæ aromatici ℥ss.
Aquæ carui... ℥j.
Misce, fiat haustus. To be taken when the pain is severe.

Or we may give a sixth to a third of a grain of the hydrochloride of morphine hypodermically, with $\frac{1}{120}$th

of a grain of atropine to relieve the paroxysm. When the pain is less severe, half-grain doses of phosphate of codein every 8 hours have been suggested, also suppositories of opium and belladonna.

Cannabis indica has been found most useful in many cases in relieving the paroxysms of pain; it may be given as follows:—

℞ Tincturæ cannabis indicæ ♏ xxv.
Mucilaginis acaciæ.. ʒj.
Aquæ chloroformi ad ʒvj.
Misce, fiat mistura. Two tablespoonfuls for a dose.

In acute gastralgia accompanied with uncontrollable vomiting Struver has given cocaine and antipyrin combined with advantage. (*See* formulæ.)

Many French physicians believe that we may avoid the too frequent recourse to opiates in some of these cases by giving chloroform water—a tablespoonful of the aqua chloroformi of the B.P. with some aromatic water—every quarter of an hour. Or a few drops of chloroform on a lump of sugar may be swallowed from time to time. It has the advantage of acting as an antiseptic as well as an anæsthetic, and of checking putrid fermentation in the stomach if any complication of that kind exists. *Cocaine hydrochloride* may also serve the same purpose as opium if the gastralgia depends on a hyperæsthesia of the peripheral ends of the gastric nerves. Half a grain dissolved in ½ an oz. of chloroform water may be given for a dose; or in more chronic forms, a quarter of a grain may be made into a pill, with a grain of extract of valerian, and given three times a day.

In hysterical cases associated with vomiting and spasm, Ewald has found the following drops useful:—

℞ Morphinæ hydrochloridi gr. iij.
Cocainæ hydrochloridi gr. v ad viij.
Tincturæ belladonnæ ʒjss ad ʒijss.
Emulsionis amygdalæ amaræ ... ad ʒj.
Ten to fifteen drops every hour.

Bismuth subnitrate is often found useful in chronic

cases. Its action would seem to be entirely local, and it should therefore be given in large doses, such as 30 grains three times a day, together with 3 to 5 minims of dilute hydrocyanic acid and an ounce of mucilage and water. Occasionally purgatives must be given when these large doses of bismuth are used, to avoid the possibility of concretions of this drug forming in the bowels.

Hydrocyanic acid alone will often relieve the pain of gastralgia, but it is a somewhat uncertain remedy, and we probably fear to give it in adequate doses.

Nitrate of silver may also be tried in chronic obstinate cases, a quarter of a grain in a pill with or without half a grain of extract of opium, an hour before taking food, twice or thrice daily.

Benefit is sometimes derived from the application of an opium or belladonna plaster to the epigastrium, or from frictions of this region with opium or belladonna liniment; or a combination of equal parts of opium, belladonna, and chloroform liniments.

ADDITIONAL FORMULÆ.

For hæmatemesis.

℞ Plumbi acetatis, ʒj.
Acidi aceti diluti, ʒj.
Liquoris morphinæ acetatis, ʒijss.
Aquæ destillatæ ad ℥viij.

M. f. mist. A tablespoonful in a little water every two hours. (*Whitla.*)

Mixture for hæmatemesis.

℞ Olei terebinthinæ, ʒiij.
Extracti digitalis fluidi, ʒj.
Mucilaginis acaciæ, ʒiv.
Aquæ menthæ piperitæ ad ℥ij.

M. f. mist. A tablespoonful every three hours. (*Bartholow.*)

Hypodermic injection for sea-sickness.

℞ Morphinæ hydrochloridi, gr. iv.
Atropinæ sulphatis, gr. ¼.
Aquæ laurocerasi, ʒss.

M. f. solutio. 15 minims is a dose. (*Dujardin-Beaumetz.*)

Cachets for acid gastralgia.

℞ Bismuthi subnitratis, Magnesiæ ponderosæ, Cretæ preparatæ, Calcis phosphatis, āā ʒijss.

M. f. pulv. To be divided into 40 cachets, and one taken before every meal.
(*Dujardin-Beaumetz.*)

Resorcin pills for sea-sickness.

℞ Resorcini puri, gr. jss ad ij.
Sacchari lactis, gr. ij.
M. f. pil. To be taken every two hours. (*H. Menche.*)

Pills for the vomiting of phthisis, of pregnancy, and of gastritis.

℞ Cocainæ hydrochloridi, gr. ⅛.
Opii extracti, gr. ⅛.
Glycyrrhizæ pulveris, q.s.
M. ut f. pil. To be taken five or six times a day, ten minutes before taking food.

Mixture for the vomiting of pregnancy, and in other forms of vomiting of both peripheral and central origin.

℞ Cocainæ, gr. ij.
Antipyrin, gr. xvj.
Aquæ, ʒiij.
M. f. mist. A teaspoonful every half hour or hour. (*Struver.*)

Enema for vomiting of pregnancy.

℞ Sodii bromidi } āā ʒss.
Chloral hydrate }
Lactis et aquæ ad ʒix.
M. f. enema. (*Guéniot.*)

For sea-sickness.

℞ Menthol, gr. ijss.
Cocainæ hydrochloridi, gr. xi.
Alcohol, ʒiij.
Syrupi, ʒjss.
M. f. mist. A teaspoonful every half hour. (*Lavallée.*)

Another.

℞ Chloroformi,
Tr nucis vomicæ, āā. ♏xxv.
Tr. lavand. co. ʒj.
Aquæ, ʒx.
M. f. mist. A teaspoonful every hour until relieved. (*Barber.*)

For gastralgia associated with mild putrefactive processes.

℞ Chloral hydrate, gr. lxxx. ad ʒij.
Aquæ ad ʒv.
M. f. mist. A tablespoonful every two hours. (*Ewald.*)

For gastralgia.

℞ Quininæ sulphatis, ʒss.
Extracti belladonnæ, gr. iijss
Extracti valerianæ, q.s.
M. et divide in pil. xv. One thrice daily. (*Millet.*)

For gastralgia.

℞ Cocainæ hydrochloridi, gr. ⅛.
Chloral hydrate, gr. x.
Aquæ menthæ piperitæ, ʒj.
M. f. haust. To be taken occasionally. (*Ewald.*)

Antispasmodic for painful gastric spasm and flatulence.

℞ Spiritus ammoniæ aromatici, ʒss.
Spiritus ætheris compositi, ʒij.
Liquoris morphinæ hydrochloridi, ʒj.
Aquæ menthæ piperitæ, ad ʒviij.
M. f. mist. A tablespoonful for a dose.

Pills for gastralgia.

℞ Argenti nitratis, gr. iv.
Pulv. opii, gr. ijss.
Pulv. rhei.
Extracti lupuli, āā gr. xij.
M. et divide in pil. xij. A pill twice or thrice daily half an hour before food.

Powders for gastralgia.

℞ Codeinæ phosphatis, gr. ¼.
Bismuthi subnitratis, gr. v.
Sacchari lactis, gr. iij.
M. f. pulv. To be taken every two hours. (*Ewald.*)

CHAPTER VII.

DISEASES OF THE STOMACH — THE TREATMENT OF DYSPEPSIA—MODERN GASTRIC METHODS.

CAUSES of Atonic Dyspepsia—Defective Relations between Diet and Digestive Capacity—Dyspepsia of Early Infancy—Overfeeding—Drinking at and before Meals—Hasty Feeding.—SYMPTOMS of Functional Dyspepsia distinguished from those of Gastric Catarrh—Pseudo-anginal Symptoms—State of Bowels and Urine—*Incidental* Nervous Symptoms—"Gastric Cramp," or Paroxysmal Pyrosis. TREATMENT: (1) *Dietetic*—Importance of careful Mastication—Selection and Preparation of Foods—Intervals between Meals—Beverages—(2) *Regimenal*—Exercise and Fresh Air—Change of Air and Travel—Hydrotherapy — (3) *Medicinal* — *Indications* — Vegetable Bitters—Hydrochloric Acid and Pepsin—Strychnia—Alkalies—Soda — Magnesia — Ammonia — Rhubarb — Bismuth — Creasote—Thymol—Charcoal—Lozenges to promote Salivary flow—Hot Water—Value of Purgatives—Mineral Waters—Dinner Pills—Calomel. *Intestinal Dyspepsia*—"Secondary Dyspepsia"—"*Nervous Debility*"—Hydrotherapy—Massage—Electricity—Change of Air—Papain as a Substitute for Pepsin—Modern Gastric Methods. Additional Formulæ.

THE somewhat vague term **dyspepsia,** when used alone, as the designation of a morbid state, refers generally to a disturbed condition of the digestive functions, the existence of which is independent of any structural or inflammatory change in the stomach itself. There is undoubtedly some force in the remark of Dujardin-Beaumetz that the term dyspepsia ought to disappear from our list of diseases, as it is a symptom, or rather a more or less varied collection of symptoms, common to different diseases of the stomach.

So also in most serious organic and constitutional affections, such as the specific fevers and acute and chronic visceral inflammations, some amount of dyspepsia, *i.e.* disturbed digestion, is an almost constant symptom, the functions of the digestive organs sharing in the *general* functional disturbance. In such cases the dyspepsia is either simply a part of a general

malady, or a disorder excited by or dependent on disease of another organ.

There are, however, some morbid states accompanied with disturbed digestion, in which it is not always clear whether the dyspepsia stands in the relation of cause or effect to the other co-existing malady; as, for instance, in such diseases as gout and rheumatism, as well as in some vague affections of the nervous system.

It is difficult, therefore, to treat the subject of so-called "*functional*" dyspepsia with any great precision. To omit it altogether, as Leube does in Ziemssen's "Cyclopædia," or to class it under the gastric neuroses as other writers do, appears to us equally unjustifiable. For there is certainly a *practical* need for its separate consideration, and although many cases which were at one time grouped under the vague heading of dyspepsia now find their place more appropriately under the more precise designations of acute and chronic gastric catarrh, dilatation of the stomach, and gastralgia, there yet remains a very large group of sufferers from disordered digestion who cannot be so classified. It is to their condition that the term dyspepsia must be applied, and it is to its treatment that our attention must now be directed.

The search for a **causal indication** for treatment in many of these cases is exceedingly difficult, and in their investigation the skill and practical sagacity and penetration of the physician are often most severely taxed.

It is assumed that in most cases of dyspepsia the gastric juice is altered or defective in quality or quantity, and that an *insufficient* secretion of gastric juice, together with deficiency of muscular action, are the determining conditions of "*atonic*" dyspepsia.

But we have then to consider what are the causes of this defective secretion of gastric juice and this lack of muscular tone in the stomach walls.

No doubt depressing agencies of all kinds may directly or indirectly impoverish or vitiate the gastric

secretions, and so induce a dyspeptic state. Exhausting illnesses; over-work, physical and mental; depressing emotions; anxiety and worry; insanitary surroundings and habits, or an unhealthy climate or residence; sedentary occupations; vicious indulgences, indolence, and want of exercise—all these may induce imperfect blood formation and the anæmic state, and a consequent defective secretion of the digestive ferments. It has been suggested with great probability that in some cases, and especially with Americans, dyspepsia is hereditary. The eager and hasty struggle for wealth, and the inordinate activity and mental excitement dependent thereon, together, probably, with faulty habits of feeding, seem certainly to have made of the modern American a dyspeptic type, the signs of which are seen even in early childhood.

One very certain and common cause of dyspepsia is the neglect to discover and establish a *due relation between the diet or food taken and the natural digestive capacities or peculiarities of the individual.* These natural peculiarities, or idiosyncracies, are of great importance, and should be carefully inquired into and observed. One person secretes habitually a large quantity of salivary ferment, another a comparatively small amount; or one individual secretes naturally a large quantity of gastric juice, another a comparatively small quantity; so with the bile, as we frequently see, and so, no doubt, with the pancreatic and intestinal ferments. Now it may happen that the persons who secrete a large quantity of gastric juice * may secrete a comparatively small quantity of saliva and of bile; or *vice versâ.* If the individual who secretes a large quantity of gastric juice and a

* With regard to the source of the acid in *acid* dyspepsia, Sir William Roberts maintains that it is derived exclusively from excessive secretion or accumulation of gastric juice, and not from any fermentive process. "The sort of windy turmoil," he says, "which goes on in the stomach of the dyspeptic has led observers too hastily to the analogy of vinous fermentation. A more precise examination of the incidents of acid dyspepsia lends no support to this view" ("Digestion and Diet," p. 241).

small quantity of salivary ferment and bile eats largely of farinaceous and fatty foods, he will become dyspeptic from inability to digest them; but if he eats largely of animal albuminates and sparingly of starches and fats, his digestion will be good and efficient. On the other hand, if another subject who secretes a minimum of gastric juice and a maximum of saliva and bile, eats largely of animal-flesh and but sparingly of carbo-hydrates and fats, he may become dyspeptic and badly nourished.

That these differences exist cannot be doubted when we note how greatly the amount and character of other secretions, such *e.g.* as that of the skin, differ in different persons. It is our duty, then, to study each individual dyspeptic closely in order to be able to establish an accurate relation (or to correct an inaccurate one) between his diet and his natural individual digestive peculiarities; and the establishment of this relation may be all that is needed to cure his dyspepsia. The food also must be adapted to age and condition. Of the weakened and less active digestive functions of advancing age, less must be required; and strength will be better maintained, in many cases, by diminishing rather than increasing the quantity of food. The *too frequent* taking of solid food and the insufficiency of the intervals between meals is a common cause of disturbed digestion in feeble persons. Indifference or inattention as to the *quality* and the *preparation* of food is also the cause of much dyspepsia. The frequent occurrence of disorders of digestion in early infancy is to a great extent due to ignorance of, or inattention to, the physiological conditions of the digestive secretions and the natural digestive capacity at that early age, and nothing less than a careful study of these conditions can enable us to treat these dyspeptic troubles of infant life successfully.

We must refer the reader elsewhere for a full discussion of the subject of infant feeding.* The

* *See* the chapter on "Food in Relation to Age and Condition" in the author's work on "Food in Health and Disease" (chap. xi.).

symptoms of dyspepsia at this age are rather *intestinal* than *gastric*, owing to the briefness of the sojourn at this age of milk in the stomach, and its rapid passage into the intestine. The child is tormented with griping colicky pains after each feeding, the abdomen becomes distended and tender to pressure, exaggerated intestinal peristalsis, accompanied with gurglings and rumblings, is evident; the stools have lost their natural bright yellow colour and uniform consistence of health; they are grumous, presenting white masses of coagulated, undigested casein, and are of a somewhat offensive odour.

The infant becomes cross and irritable, its sleep is disturbed, and it is clamorous to be constantly fed; and each feeding is followed by eructations or vomiting of coagulated milk. If this condition of things is not remedied, the child becomes feverish, emaciated, and symptoms of gastro-enteritis appear. The suitable treatment and appropriate remedy for this state is to be found almost solely in an appropriate hygienic diet. The value, however, of antacids and gentle aperients as adjuvants in these cases is undoubted. Lime water with a little milk, or calcined magnesia, which has the advantage of being aperient as well as antacid, or, if there is diarrhœa, a few grains of subnitrate of bismuth, may be mixed with the magnesia, or a small dose of Gregory's powder, or 15 to 30 minims of castor oil made into an emulsion with a little syrup and mucilage may be given. One or other of these remedies is often useful to remove acidity, to allay irritative diarrhœa, or to sweep away offending substances from the bowels.

But the simple fact of the introduction of too much food into the stomach is responsible for much of the dyspepsia of modern life, and a too great eagerness to follow a so-called "supporting" method of treatment in dealing with anæmic conditions and states of nervous exhaustion has been to some extent the cause of this. It should be borne in mind that in these cases the digestive powers of the stomach

share in the general enfeeblement, and that they need relative rest and a diminution of work in order to restore their tone and vigour.

The habit, also, of drinking largely *at meals*, while it must interfere with the chemical activity of the gastric juice, also tends to encourage too large a consumption of food. Man is, perhaps, the only animal who drinks and eats at the same time. The desire to continue eating is greatly lessened if no beverage be taken at meals, and hence some of the success attending the abstinence from fluids during meals in the treatment of obesity. A certain amount of water is, of course, necessary for the wants of the system, and most articles of food contain a very large proportion of water in their composition; and no physician would object to a good draught of water, preferably hot, half an hour or so before eating, when it dilutes or washes away the residue of the former meal, and refreshes and prepares the stomach for the next.

Haste in eating and imperfect mastication and insalivation are also fruitful sources of dyspepsia. The food is not sufficiently crushed and subdivided by the teeth, and it is not sufficiently incorporated with the frothy saliva which aërates it, so to speak, and makes it readily permeable by the gastric and intestinal secretions.

These **mechanical** changes in the mouth are, doubtless, of greater importance in digestion than the *chemical* action of the salivary ferment, which can be supplemented lower down by the action of the pancreatic and intestinal juices, but once passed out of the mouth there is no other agency in the whole alimentary canal for mechanically crushing the food.

In the foregoing observations we believe will be found enumerated the chief causes of functional dyspepsia.

Before, however, proceeding to the question of treatment, it will be desirable to enumerate briefly the **symptoms** which are usually found to accompany this form of disordered digestion. They are much the

same as those which accompany chronic gastric catarrh, and it is, therefore, not always easy to separate these two affections. But functional dyspepsia occurs more commonly in temporary attacks, recurring more or less frequently, and is induced by slight causes, such as a trivial error in diet, some mental worry or over-exertion, physical or mental; or it may be noticed when the patient's health becomes depressed from any cause. It must be remembered, also, that the dyspeptic person is especially likely to become the subject of gastric catarrh, or of gastralgic attacks. Loss of appetite and an uncomfortable sense of weight and fulness after taking food, flatulent distension of the stomach, with acid eructations, "heartburn," dyspnœa, palpitation and flushing after food, all these symptoms are usually observed. An absence of furring or coating of the tongue, and of any bad odour in the breath, are often means of distinguishing atonic dyspepsia from chronic gastric catarrh. Stimulating articles of food, such as spices, pickles, and the like, will often relieve the distress of the atonic dyspeptic, while it will increase that of the catarrhal one. Some dyspeptics complain of pain between the shoulders extending to the left arm, and resembling the pain of angina, and if this is associated with a weak and irregular action of the heart, it may be difficult to distinguish these attacks from true angina. The fact, however, of their occurring *after* food, and not coming on after *physical* exertion, together with the presence of other symptoms of dyspepsia, will generally help us to distinguish between them. Sometimes an examination of the heart will show that it is really feeble and dilated, and in such cases treatment must be directed to restore the tone of the heart as well as that of the stomach.

The absence of thirst, of tenderness in the epigastrium, and usually of nausea and vomiting, is also relied upon as distinguishing functional dyspepsia from gastric catarrh.

Constipation is a very common and troublesome

symptom in these cases, and must never be overlooked in their treatment. The urine may be pale and abundant, but it is also often high-coloured, and deposits lithates on cooling, owing to imperfect intestinal assimilation. Its specific gravity may occasionally be so high as to excite the suspicion of diabetes, but this is usually due to an increase in the ordinary urinary solids. It is often much darkened by boiling and nitric acid, assuming various shades of the well-known mahogany hue. In the neurotic it will often deposit an excess of phosphates; at other times crystals of oxalate of lime may be detected in the deposit on microscopic examination.

Various occasional and incidental symptoms are associated with attacks of dyspepsia. Some of these are probably caused by the non-elimination and the absorption into the blood of toxic substances occasionally produced during stomach or intestinal digestion; or these substances may be produced normally during one part of the assimilative process and destroyed in a later part; and the failure of this later act in the assimilative process may be the cause of some of the symptoms observed.

Giddiness is one of the most alarming of these symptoms, and is probably caused by some sudden vaso-motor disturbance. More protracted nervous affections in the form of migraine headaches, ocular migraine, hemiopia, and other visual disturbances are not rare.

Languor, drowsiness, depression of spirits, or irritability of temper and sleeplessness are also frequent.

The occurrence of "*gastric cramp or paroxysmal pyrosis*" as an occasional symptom in the course of acid dyspepsia has been mentioned by Sir William Roberts * as a "peculiar and characteristic symptom." It consists in a sudden attack of cramp of the stomach with sudden profuse salivation, lasting half a minute

* "Digestion and Diet," p. 247.

to a minute. He suggests that the term "pyrosis" should be confined to these paroxysms. There is but little sense of nausea during the attacks, and they rarely culminate in actual vomiting. The saliva gushes from the mouth in great abundance, and it is unusually alkaline. The paroxysm only occurs when there is surplus acid in the stomach, and the relief which follows the paroxysm is due to the large quantity of alkali conveyed to the stomach in the saliva swallowed. These paroxysms of pyrosis may occur once a day, or once in two or three days, sometimes only once a week, once a month, or once a year.

The **treatment** of functional dyspepsia may be considered under three headings—(1) dietetic, (2) regimenal, and (3) medicinal.

(1) **Dietetic treatment.**—We have already called attention to the part played in the causation of dyspepsia by imperfect mastication and insalivation. This must be strictly enquired into and remedied. Defective teeth should be seen to, and when this defect cannot be rectified, food should be given which needs but little mastication; the crumb of stale bread, thin dry toast, and some kinds of biscuit readily disintegrate in the mouth, whereas *new* bread forms tough, coherent masses there.

Vegetables should be reduced to the form of purées, potatoes especially should be *mashed* fine, and *new* potatoes which are "waxy" should be prohibited. All fats should be finely divided and mixed with other foods, and not eaten in lumps. If, owing to defective teeth and tenderness of the gums, mastication is painful, lean of meat should be pounded or reduced to pulp. The American mincer may be used for this purpose.

The shorter fibre meats are the best for dyspeptics, as they are more easily disintegrated. The quality of the meat should be looked to—different qualities of mutton, beef, or fowl will differ greatly in their digestibility. White-fleshed game is more digestible than the dark kinds; the delicate sole, whiting, or

flounder than the firmer and richer-fleshed mullet, salmon, etc. Foods saturated with butter or fats must be avoided; they are almost impenetrable to the gastric juice. Sweetened dishes are also to be avoided as prone to excite acid fermentation, as well as all unripe fruits, nuts, and the cellulose coverings of vegetables, as difficult of digestion. It is hardly necessary to insist that the preparation and cooking of the food should be good and savoury. Sauces and melted butter should not be taken: with fish, plain butter, if required, and a little lemon juice may be used. The bread should be carefully selected, as some kinds of bread are apt of themselves to cause dyspepsia; and too large a quantity of imperfectly masticated bread is a common source of disordered digestion. A good bread should be porous, crumble easily, and not mass together in the mouth in mastication. Some kinds of *wholemeal* bread, although very nutritious and pleasant to eat, are difficult of digestion, and will certainly aggravate the dyspepsia of some persons.

The **meals** of a dyspeptic should be small or very moderate in quantity, and our object should be *to select a diet which, while it affords the necessary amount of nourishment to the body, imposes the smallest amount of labour on the stomach.* These small meals should be eaten slowly, and a sufficient time allowed to elapse between them to insure the complete digestion of one meal before the next is taken. *Solid* food takes from five to eight hours to digest,* according to its nature and quantity, and in old age and in persons of feeble digestion it may take longer. *This is one of the facts of feeble digestion most difficult to get accepted, not only by the patient, but often also by the doctor!*

Persons with no occupation are very apt to take

* The estimates published in books on the physiology of digestion, of the periods of time required for the digestion of different articles of diet in the stomach, will be found, when tested by practice, especially amongst the dyspeptic and persons of middle and advanced life, to be far too brief.

food too frequently, and to suffer in consequence from dyspepsia.

The dyspeptic should rest for a short time before a meal, and for a longer time after one. Abuse of alcohol and tobacco, of tea and coffee, should be interdicted. In some cases of atonic dyspepsia a small quantity of sound wine or spirit with water, taken just before or after a meal, seems to serve as a useful stimulus to gastric secretion; the same purpose will be better served in many by 4 or 5 tablespoonfuls of hot, clear soup at the beginning of the repast.

The use of tea * and coffee requires discrimination. When the dyspepsia is associated with irritability of the nervous system it is best to avoid both. In other cases it is advisable not to take them with or soon after food—they then often retard digestion; but taken three or four hours after a meal, and taken alone, and not too strong, they appear to promote, in some persons, the final stage of stomach digestion. A cup of hot water, slowly sipped, and taken instead of tea or coffee three or four hours after a meal, proves very useful to most dyspeptics.

In anæmic cases a moderately stimulating diet is best: agreeably flavoured animal food and soups are more easily digested than farinaceous ones, which have a tendency to undergo acid fermentation in those with feeble digestions.

Individual peculiarities, as we have already said, must be carefully studied, as they may depend on physiological variability of function.

Uncooked and green vegetables must be avoided, as they are very prone to give rise to flatulence.†

(2) The **régime**, or mode of life of the dyspeptic, requires careful attention. Sedentary habits must be given up, and free exercise in the open air insisted upon. Removal from the town to the country,

* It is important to the dyspeptic that he should drink China and not Indian tea. The latter contains an injurious proportion of tannin.

† Further details as to diet in indigestion will be found in the author's work on "Food in Health and Disease."

or to the sea-side (with sea-bathing), or a tour in Scotland or amongst the Swiss Alps, will be found sufficient to cure many troublesome cases of dyspepsia. When this is not convenient, a course of hydrotherapy in a well-organised hydropathic establishment, where at the same time the food habits are carefully attended to, will often be of great service.

More confirmed cases, especially when complicated with hypochondriacal symptoms, may require a more prolonged period of travel and frequent change from place to place.

(3) **Medicinal treatment** also will be needed in most cases*; (*a*) *to promote the functional activity of the muscular coat and secreting glands of the stomach.*

For this purpose the vegetable bitters, quassia, gentian, calumba, nux vomica, chirata, bitter orange-peel, hop, etc., combined with an alkali—if there is excess of acidity with sour eructations; or with a mineral acid if there is reason to suspect a deficiency in the acid of the gastric juice — are of undoubted value in promoting the activity of the digestive functions and exciting appetite. It is difficult to explain how these vegetable bitters act, but from recent observations it would appear that, given a short time before a meal, they promote the secretion of free hydrochloric acid, and in cases where there is a tendency to deficiency of this acid in the gastric juice, they prove efficacious gastric tonics. Either of those mentioned may be used, but the combination of calumba or gentian with nux vomica has appeared to us a most useful one. In cases where there are acid eructations the addition of sodium

* Sir William Roberts ("Digestion and Diet") divided dyspepsia into an *atonic* form and an *irritative* or *acid* form. In the first there is deficiency of gastric juice and of muscular action in the stomach; in the second there is an undue secretion or accumulation of acid in the stomach, especially towards the later stages of digestion. We recognise the practical value of this division in our indications for medicinal treatment. It corresponds with the division of French authors into *hypochlorhydric* and *hyperchlorhydric* dyspepsias.

bicarbonate is most useful; its effect in promoting the secretion of the gastric glands when given on an empty stomach is generally admitted. We are in the habit of prescribing the following draught as one of the best remedies for atonic dyspepsia when taken half an hour or an hour before meals: —

℞ Sodii bicarbonatis		gr. xv.
Tincturæ nucis vomicæ		♏xl.
Tincturæ calumbæ		ʒss.
Spiritus ammoniæ aromatici		ʒss.
Infusi aurantii compositi		ad ʒj.

Misce, fiat haustus. To be taken three times daily, half an hour or an hour before food.

If, on the other hand, we find there is great slowness and torpor of digestion, probably from insufficient acidity of the gastric juice, we may give the above mixture, leaving out the soda and ammonia, and adding 10 minims of dilute hydrochloric acid, 5 or 6 grains of *pepsin*, and 1½ minims of tincture of capsicum, immediately or soon after meals thrice daily. It is better sometimes to give the pepsin during or at the commencement of a meal, and the acid bitter mixture an hour or two afterwards.

When there is great muscular debility and nervous exhaustion associated with the dyspepsia, 5 minims of the liquor strychninæ may be given instead of the nux vomica with each dose of the acid mixture.

(*b*) *To relieve acid eructations and flatulent distension.**

One of the most annoying troubles of dyspeptic patients is attacks of flatulence with sour eructations

* The remarkable fact that, in cases of acid dyspepsia, the ingestion of a meal will sometimes relieve the dyspepsia, is thus explained by Sir William Roberts: "The acid residuum is not entirely got rid of when the next meal arrives; in this case the sour mucus for a short space of time floats on the surface of the new meal, and the eructations are consequently acid; but presently it mingles with the meal, and the degree of acidity of the total gastric contents is thereby reduced by dilution, and the eructations cease to be sour." Such persons "are cured, much to their surprise, by taking a full meal, the fact being that the new meal gives the surplus acid work to do and so ends the attack." ("Digestion and Diet," p. 238.)

and "heartburn." Some warm stomachic and alkaline mixture should be given the patient for occasional use when these attacks occur, which they often do, two or three hours after a meal. Fifteen to 30 grains of bicarbonate of soda in half a teacupful of hot water will often suffice. The following draught is also very efficacious:—

℞ Tincturæ rhei ʒss.
Sodii bicarbonatis gr. xv.
Magnesii carbonatis gr. x.
Spiritus ammoniæ aromatici ʒss.
Aquæ carui ad ʒjss.
Misce, fiat haustus. To be taken occasionally.

Bismuth lozenges are useful expedients for this purpose, and are largely used. The *soda-mint* tablets are also good, but all these dissolve too slowly to give immediate relief.

When the flatulent distension of the stomach is a very troublesome symptom, a pill containing *creasote* or *menthol* given immediately after food is often very efficacious in arresting it.

Creasote may be given in capsules, each containing 1 minim, and menthol in grain doses also in the same manner. Creasote, however, will prove irritating to some patients if given pure in capsules, and it is better to give it made into a pill (and menthol also) with powdered soap.

℞ Menthol, gr. j (*vel* creasoti, ♏ss).
Pulveris saponis, quantum sufficiat.*
Ut fiat pilula. To be taken after food thrice daily.

Bismuth will also be found very useful in relieving cases of acid flatulent dyspepsia, and it seems to have a tonic effect resembling that of iron in some of these

* A little spirit may be needed to make the menthol and soap into a pill. The following has been given as a good formula for making creasote into pills:—
Creasote 15 grains.
Powdered liquorice root (not decorticated) ... 30 grains.
Set aside for a few minutes, and then add 3 drops of distilled water. Rub them together, and divide the mass into the number of pills desired.

cases. We are accustomed to prescribe the following mixture:—

℞ Liquoris bismuthi et ammonii citratis ... ʒj.
Sodii bicarbonatis gr. x.
Spiritus chloroformi ♏xx.
Infusi calumbæ ad ℥j.

Misce, fiat haustus. To be taken an hour before food three times a day.

Some cases of acidity, especially those due to butyric or acetic fermentation, seem to be more amenable to treatment with dilute hydrochloric acid. It should be given in small doses, 10 to 15 minims, with some light bitter infusion just before food. It acts as an antifermentive.

Charcoal is a popular remedy for gastric flatulence, but we have not found it so efficacious as the above bismuth mixture. It is sometimes given in combination with bismuth—5 to 10 grains of powdered wood charcoal with 5 grains of bismuth. This powder may be taken in a cachet immediately before, or soon after a meal, according to the period when the flatulence is most complained of. Sir William Roberts has suggested the sucking of gum lozenges to promote the natural flow of saliva, and so diminish the acidity of the stomach's contents by neutralising it with alkaline saliva.

A very simple and efficacious remedy for some forms of *acid* dyspepsia, those forms especially which are so common, of an excessive formation of acid towards the end of stomach digestion, is the administration of a draught of hot water three or four hours after a meal. This dilutes the acid contents of the stomach, and the discomfort or even pain caused by the excessive acidity is at once relieved. If, however, the amount of acid is very great, it is advisable to add a few grains of magnesia or of sodium bicarbonate to the hot water.

Dr. Huchard advocates very large doses of the *sodium bicarbonate* for the relief of severe paroxysms of gastric pain arising from hypersecretion of hydro-

chloric acid. In a case in which extremely severe pains, with pyrosis, occurred at 11 a.m., 3 p.m., and at midnight, and lasted an hour or more each time, after trying various modes of treatment without any good result, he at length gave frequent large doses of sodium bicarbonate with complete success. He holds that in these cases there is a continuous secretion of hydrochloric acid, *not* limited to the periods of digestion, but occurring also during the intervals; that the contact of this acid with the surface of the empty stomach induces a loss of power in the muscular walls, while the excess of acid during digestion arrests the conversion of starchy foods into sugar, and these ferment in the stomach, and this fermentation, together with the loss of tone in the muscular wall, starts a tendency to *dilatation*. At the same time there is also a great tendency to the occurrence of ulceration of the mucous membrane from quite slight causes, as *e.g.* a blow on the epigastrium.

An adequate *alkaline* treatment is, therefore, urgently indicated. The patient referred to was given 6½ drams of sodium bicarbonate in twenty-four hours in repeated doses of 15 grains, together with an alkaline water at his meals, and milk mixed with lime water. The next day the patient was greatly relieved, and the improvement increased from day to day. Some prepared chalk was added to the sodium bicarbonate, as the latter is too soluble, and its neutralising action is, therefore, too soon exhausted. The insoluble lime salt acts more slowly, and is dissolved only in proportion to the acid secreted. For the accompanying constipation the patient had also two large spoonfuls of calcined magnesia daily. The patient was cured. Dr. Huchard refers with justice to the "*ridiculous fear* of an alkaline cachexia" which prevents many practitioners from giving adequate doses of sodium bicarbonate in cases like this.

(*c*) *To promote complete elimination of the bye-*

products of a sluggish and disordered digestion, and to remove noxious accumulations in the intestinal canal.

The paramount importance of relieving the constipation that accompanies most cases of atonic dyspepsia is evident. It is, perhaps, in many cases the original evil. The retention of noxious bye-products of digestion in the intestinal canal and their absorption into the blood is probably the cause of many of the *general* symptoms present in chronic dyspepsia, *e.g.* the headaches, the giddiness, the languor and drowsiness, the mental depression, and the hypochondriasis; while the tendency to abdominal venous stasis which must necessarily be associated with an inactive state of the intestinal walls naturally leads to an impairment of the secreting functions of the glands of the stomach and intestine.

It is in responding very thoroughly to this indication that courses of mineral waters prove so valuable to dyspeptic patients. No more brilliant results are obtained in medicine than from the application of such courses of waters as may be obtained at Carlsbad, Marienbad, Kissingen, Tarasp, or Brides-les-Bains in cases of dyspepsia with habitual constipation. Some practitioners tell their patients that such courses are "too lowering"; but they are, on the contrary, health-restoring, and, therefore, *tonic* in the best and truest sense. They frequently prove tonic and restorative after all the so-called tonics, such as iron, quinine, strychnine, arsenic, etc., have utterly failed; and they do so by washing the intestines clean, by removing toxic accumulations, by promoting the abdominal circulation, by stimulating the secretion of the liver and all the peptic glands, and, in short, by promoting due elimination; and these excellent effects are associated with the hygienic influences of a suitable, well-regulated diet, and a life largely spent in the open air.

For cases of chronic atonic dyspepsia, dependent

on defective gastric secretion, and muscular want of tone, the waters of Kissingen, Homburg, or Brides-les-Bains are most suitable. The Ragoczy spring at Kissingen is especially renowned for its curative influence in cases of atonic dyspepsia. In cases of irritative dyspepsia of a gouty nature, or in plethoric persons, the warm alkaline-sulphatic springs of Carlsbad are especially valuable. When the dyspepsia is associated with loss of nervous tone, and a more bracing influence is needed, the greater elevation of Marienbad or Tarasp is particularly suitable. In cases where there is much gastric irritability, and a tendency rather to diarrhœa than constipation, the waters of Vichy or Neuenahr are more applicable.

It is quite practicable, if patients will submit to a strict *régime* of diet and exercise, and reside in a healthy, open situation during the treatment, to follow a course of these waters in England. We have repeatedly prescribed and directed such courses with excellent results. The waters of Leamington and Harrogate are suitable to some of these cases.

But other means may be adopted, and, indeed, are required, to relieve the constipation, and these will answer better with some persons than mineral waters. One of the best of these is a pill of a grain or two of extract of aloes, $\frac{1}{2}$ or $\frac{3}{4}$ of a grain of powdered ipecacuanha, and a grain of soap, taken just before the principal meal of the day. If the aperient effect of this pill is not sufficient, it can be supplemented by taking next morning, fasting, in a tumblerful of hot water, this powder:

℞ Sodii sulphatis ʒj.
Sodii bicarbonatis gr. xv.
Sodii chloridi gr. x.
Misce, fiat pulvis.

On the other hand, there are cases which are very sensitive to the action of aperients. They require

aperients, but they must be mild ones. With such patients the following pill serves not only as a gentle aperient, but also as an excellent stomachic, and stimulates gastric secretion:—

℞ Ipecacuanhæ pulveris gr. ½ ad ¾.
Rhei extracti gr. ij vel iij.
Nucis vomicæ extracti gr. ½.

Misce, fiat pilula. To be taken half an hour before food, twice or three times a day.

In other cases no remedy seems so useful as small doses of calomel, its remedial action being greatly due to its efficacy as an intestinal antiseptic, and its powerful destructive influence on anaërobic bacilli.

Dr. Carter, of Liverpool, has testified strongly to the value of calomel in controlling the abnormal gastric and intestinal fermentations in children. He prescribes $\frac{1}{20}$ grain of calomel with 1 grain of boric acid with the child's food three times a day.

Under the designation **intestinal dyspepsia,** a variety of conditions have been described, dependent, some on functional or organic disease of the liver and pancreas, some on acute or chronic intestinal catarrh, and some forming really a part of the phenomena of gastric indigestion. These last only concern us now.

The normal course of intestinal digestion will necessarily be disturbed when the results of stomach digestion are abnormal, and the food is passed on from the stomach to the small intestine in an imperfectly prepared state. This may arise simply from over-feeding or from admitting into the stomach food that cannot be digested there. The dyspepsia of infants is often of this character. It may occasionally happen, but this is probably very rare, that there exists what has been termed an "incontinence of the pylorus," which relaxes too soon and allows of a premature passage of the food from the stomach into the duodenum. It might thus happen that more undigested food found its way into the small intestine than could be digested there, and intestinal colic

flatulence, and diarrhœa might thus be set up. So, also, in cases of acid dyspepsia, the chyme passing into the small intestine may be so excessively acid as to destroy or greatly weaken the digestive powers of the alkaline bile and pancreatic juice, and so symptoms of intestinal indigestion would be aroused. Duodenal catarrh and catarrhal jaundice may also thus be occasioned.

But the treatment appropriate to these states is obviously that adapted to the amelioration of the disturbed gastric functions upon which they are dependent.

The treatment of so-called **secondary dyspepsia,** associated with cardiac and hepatic disease, with chlorosis, scrofula, tuberculosis, gout, rheumatism, and organic nervous affections, will be dealt with when we come to consider the treatment of these morbid states.

We may, however, discuss briefly here the treatment best suited to those not uncommon forms of dyspepsia which are associated with what is termed "**nervous debility,**" and which are often induced by worry and anxiety. Many of the symptoms complained of must be dealt with on the general principles already laid down, but we must not overlook the necessity of applying at the same time restorative treatment to the exhausted or irritable nervous system. Such cases are often marvellously benefited by a course of hydrotherapy associated with *massage,** or with the application of the continuous

* *Massage* is very useful in some cases of atonic dyspepsia. It should be applied in the following manner: The patient, two or three hours after a full meal, should be placed on his back with the head and shoulders raised, the thighs flexed on the pelvis, the mouth a little open, and free respiration encouraged. The physician should begin by tapping or stroking gently and superficially over the region of the stomach; during these manipulations he should gradually increase the amount of pressure employed, till, after a longer or shorter time, according to the sensitiveness of the patient, he is able to thoroughly knead the stomach. All these manipulations, which should not last longer than about ten minutes, should be made in the same direction, *i.e.* from the cardiac end and the greater curvature towards the pylorus. The effect of this massage is to accelerate the passage of the food into the

galvanic current; change of climate, especially to mountain air (the sea-side often disagrees with such patients), and abundance of out-of-door exercise are also of great value.

Some *nervine* medicines are also of use. In cases chiefly of nervous *exhaustion*, a pill of a grain and a half or 2 grains of *valerianate of quinine* with half a grain of *extract of nux vomica*, an hour before meals three times a day, will be found valuable; and in cases of *irritability* of the nervous system it will sometimes be found better to give 10 or 15 grains of *bromide of sodium*, with half a dram of *tincture of serpentary* in an ounce of caraway water, half an hour before lunch and dinner.

As the gastric juice secreted by these patients is often defective in quality or deficient in quantity, or both, it is often advisable to supplement this by the administration immediately after food of a digestive ferment such as a dram of Benger's liquor pepticus or 6 or 8 grains of good pepsin, with 5 to 10 minims of dilute hydrochloric acid, 3 minims of liquor strychninæ, and 3 minims of tincture of capsicum, in an ounce of compound infusion of bitter orange-peel.

Papain has been advocated as a more reliable and more certain digestive ferment than pepsin; we have not, however, been able to satisfy ourselves that it is so. It is the active principle of the Carica papaya, or South American melon tree.

duodenum and to prevent its too prolonged stay in the stomach, and also to evacuate the stomach of any lingering imperfectly digested substances remaining from a previous meal. It further rouses the contractility of the muscular coat of the stomach, and increases the secretion of gastric juice. *Massage of the stomach* should be followed by massage of the intestines for about four or five minutes, to overcome co-existing constipation; the manipulation should of course follow the large intestine from cæcum to sigmoid flexure. The following results have been observed to follow this treatment: a sense of relief and comfort immediately after the *séance*, the disappearance of the distressing feeling of weight and heaviness so common, during the digestive process, with these patients. A desire to sleep is often experienced, and the hypochondriasis from which dyspeptics so often suffer is greatly relieved.

The papain extracted by Professor Finckler's process is considered to be the best. It is said to have the advantage over other digestive ferments of acting either in an acid, alkaline, or neutral medium. It is also stated to be antiseptic in its action, and to exert a local tonic and sedative effect on the stomach.

The dose of papain Finckler is 2 to 5 grains dissolved in half a wineglass of water after meals.

MODERN GASTRIC METHODS.

In the preceding chapters we have dealt with the treatment of the *chief clinical* types of gastric disorders. It would occupy much space, and would be of doubtful practical utility, from the point of view of clinical therapeutics, to consider the various subdivisions and forms of dyspepsia, as set forth in some recent treatises on gastric diseases—such as "Achylia Gastrica," "Neurasthenia Gastrica," "Hyperchlorhydria," "Gastro-succorrhœa," etc. etc. etc. We must here, as elsewhere, be on our guard against the growth of mere *phraseology*, with which, to our thinking, medical science is already gravely overladen! It will be found that the treatment of most of the symptoms corresponding to these names have, in fact, been considered in the foregoing pages.

We must, however, in this place, call attention, briefly, to certain methods of investigation and treatment of gastric maladies which take a more or less prominent position, nowadays, in special treatises on these affections. These methods have their limited uses, but they have also, unhappily, their almost unlimited abuses. The introduction and advocacy of elaborate technical and mechanical contrivances in the treatment of diseases which hitherto have been cured without them, is not altogether a matter of congratulation.

Certain measures have been invented with the object of testing the efficiency of the functions of the stomach: (1) the functions of secretion; (2) the

functions of absorption; (3) the motor functions; and (4) the mechanical functions.

1. In order to examine whether the gastric secretion is normal or not it is usual to give the patient a "*test meal*," and then to withdraw some of the contents of the stomach, for detailed examination, a certain time after the meal. Several test meals have been proposed by different physicians, but the simplest and best and the one most generally adopted is the test breakfast of Ewald and Boas. It is given in the morning, fasting, and consists of one or two rolls of bread (about 2 oz.) and a cup of tea or water (8 to 10 oz.). The stomach contents are examined about an hour after the meal. They may be obtained either by the method of *aspiration* or *expression*. In either case a soft rubber tube is introduced into the stomach in the usual way, and for *aspiration* a rubber bulb is attached to the outer end of the tube, and this bulb is first compressed and then released in the ordinary manner, and the gastric contents are thus made to flow into the bulb.* The *expression* method, which is considered the best and easiest way of obtaining the gastric contents, consists in causing the patient to exercise pressure upon the stomach by means of his abdominal muscles. He first inspires deeply, and then compresses his abdominal walls as in the act of defecation. The pressure thus exerted on the gastric contents expels them through the tube into a suitable receptacle held in the patient's hand.

Max Einhorn admits that this examination is often unpleasant and repugnant to the patient, and that some "absolutely refuse to submit to it."

To overcome this difficulty he has devised a "stomach-bucket"—a small silver capsule ($1\frac{3}{4}$ c.m. long, $\frac{3}{4}$ c.m. wide), with a large opening at the top and an arch to which a silk thread is tied, and a knot made in it 16 inches from the attachment. The patient is made to swallow this bucket with certain precautions

* *See* Max Einhorn's "Diseases of the Stomach" (second edition), p. 42.

—it is allowed to remain about five minutes in the stomach, and is then withdrawn and its contents examined. Some small details have to be attended to in this process, which Einhorn describes.* He says, "This method seems to be especially adapted to all cases where there is suspicion of an ulcer in the stomach, and when we desire to avoid the tube. It is also suitable for the general practitioner who does not intend to make an exact analysis of the gastric contents, but who desires to determine whether there exists in them free hydrochloric acid or not."

The contents are tested first with *litmus* paper—if this is reddened the contents are *acid*; second, with *Congo* paper—if this is turned *blue* it shows the presence of *free* acids; third, it is tested for the presence of *free* hydrochloric acid. For this purpose one drop of the contents is mixed thoroughly with one drop of *Günzburg's* solution† in a white porcelain dish, then heated over a spirit lamp, when the fluid evaporates. If a cherry-red colour appears, free hydrochloric acid is present.

If the contents of the stomach continue to give this reaction when diluted eight to ten times, the amount of acidity, it is stated, is probably normal; if it can be diluted to over twelve times and still yields this reaction it is probably *too*-acid (hyperacidity); and if it fails to do so when diluted five times or less it contains too little acid (subacidity).

But we must not place too much reliance on these inferences.

The chief value of this examination to the general practitioner is the proof it gives of the presence of *free* hydrochloric acid in the stomach contents. A more detailed examination of the chemistry of the gastric secretion must be left to the pathological chemist, as it will require far more time and more analytical skill than the general practitioner can possibly have at his

* "Diseases of Stomach" (second edition), p. 64.

† This "Vanillin-Phloroglucin Test" can be made by dissolving phloroglucin 30 grains, vanillin 15 grains, in 1 ounce of alcohol.

disposal. And we have no hesitation in repeating that the value and import of such examination has been greatly exaggerated by some specialists!

2. To test the *absorptive* functions of the stomach it is usual to give 2 or 3 grains of potassium iodide (preferably when the stomach is nearly empty) enclosed in a gelatine capsule, and to examine for its presence in the saliva every minute or two, by moistening a piece of starched paper with the patient's saliva and then adding a drop of nitric acid, when if iodine is present the characteristic violet or blue colour appears on the starch paper. In normal conditions it takes from eight to fifteen minutes for this reaction to appear in the saliva.

3. To test the *motor* function of the stomach the "best and easiest way," according to Einhorn, "is to examine this organ, by means of the tube and lavage, in the morning, in the fasting condition, after the ingestion of a substantial supper on the night previous. Normally the stomach is empty, and therefore when the organ is found to contain a quantity of food, this is the best sign of retarded motion."

Ewald has recommended another method, which, as Einhorn rightly states, is by no means absolutely reliable. This is the *salol* test, and is based on the property possessed by this drug of breaking up in the presence of a weak alkaline fluid into phenol and salicyic acid, while it is not decomposed in acid solutions. The salol, therefore, will not undergo any change in the *acid* contents of the stomach, but on leaving that organ and meeting the alkaline juices in the small intestine, it splits up into phenol and salicylic acid, and the latter entering the blood is eliminated in the urine as salicyluric acid, and can be detected therein by its producing a violet colour when neutral ferric chloride solution is added.

To apply this test the patient is given two gelatine capsules filled with salol (about 7 grains in each) half an hour after a slight meal (having emptied his bladder immediately before): he then urinates every

half hour for two or three hours. All the specimens are then tested with ferric chloride, and we note in which the violet colour first appears. Normally it should appear in about an hour, but if the motor function of the stomach is feeble it may not appear for two hours, or even longer. A delicate way of applying this test is to moisten a piece of filter paper with the urine and then by means of a glass rod to place a drop of ferric chloride solution on the middle of the moistened paper. The edges of this drop will assume a violet colour if the smallest trace of salicyluric acid be present.

4. To test what has been termed the "mechanical" function of the stomach, *i.e.* the changes produced in the physical condition of foods by the churning motions of the stomach, Einhorn has devised a contrivance which he terms the "gastrograph." For an account of this apparatus and the mode of applying it we must refer to the author's description.* Of this and of the "Hemmeter-Moritz" method of testing the gastric peristalsis, we have come to the conclusion, after much careful consideration, that however useful they may be in physiological investigations, they can never become permanent or profitable methods of clinical medicine. They are an outcome of excessive specialisation!

Gastrodiaphany is the term applied by Einhorn to a method of transilluminating the human stomach for the purpose of determining its *exact position* and *size*, or for *ascertaining the existence of tumours* or thickenings of the anterior wall by their lack of transparency. An Edison lamp, fastened at one end of a soft rubber tube by means of a small metal mounting, is introduced into the stomach, and is connected by wires with the battery. At some distance from the rubber tube is a current interrupter.

"The patient, in a fasting condition, drinks one or two glasses of water; the apparatus, moistened with

* Max Einhorn's "Diseases of the Stomach" (second edition), p. 89.

water, is then inserted into the stomach and connected with the battery. The examination is made in a perfectly dark room. The stomach transmits the electric light through the abdominal walls, and it thus becomes visible as a red zone at that place of the abdomen which corresponds with the position of the stomach. In case the gastric front wall is occupied by a tumour, the latter will not transmit the light, and will be recognisable as a shady spot within the red zone of the transilluminated organ." Max Einhorn gives drawings showing the application of this method to cases of gastrectasis, gastroptosis, and gastric carcinoma.*

We have already described fully the method of lavage of the stomach; we must now refer to a method of *spraying* the stomach suggested by Einhorn. Its object, according to its author, is to enable us to apply medicines of a toxic or irritating character, without risk of producing poisonous effects, by using them in the form of a spray, "by means of which large surfaces can be covered with a comparatively small amount of fluid." We can thus either (*a*) disinfect the mucous membrane of the stomach, or (*b*) exert an astringent effect, or (*c*) produce analgesia in gastralgia dependent on ulcer, cicatrix, or cancer. The apparatus consists of an ordinary spray apparatus in which there is a soft Nélaton tube 70 c.m. in length inserted between the nozzle and the hard rubber branch proceeding from the bottle; within the Nélaton tubing another soft tube of thinner calibre connects the inner capillary tube with the nozzle.

It is, of course, only possible to *spray* the stomach in its empty state; it can only be applied when fasting or after a preliminary lavage. Einhorn maintains that spraying the stomach has proved very useful in *erosions* of the mucous membrane, in cases of *chronic gastric catarrh* with abundant secretion of mucus, and in cases of *hypersecretion* and *hyperacidity*.

* "Diseases of the Stomach" (second edition), p. 37.

We have incidentally alluded in preceding pages to the use of *electricity*, applied externally, in the treatment of gastric disorders; we must now refer again in rather more detail to the application of electricity in these affections both externally (percutaneously) and internally ("direct electrisation").

The method usually adopted for the *external* application of electricity is to apply one electrode to the neighbourhood of the spine at about the sixth dorsal vertebra on the left side, and the second electrode to the epigastrium. This mode of applying electricity, combined with general electrisation, has been found of much value in treating nervous dyspepsias. It has also been found to produce a more abundant secretion of gastric juice, and to ameliorate the motor function of the stomach.

Kussmaul was one of the first to practise *direct* electrisation of the stomach by introducing one of the electrodes into the stomach itself through a stomach tube; he treated several patients with dilated stomachs in this way. Bardet devised another method which was an improvement on Kussmaul's; but both methods were found, in practice, to be very exhausting to the patient.

Einhorn * has suggested another method which he considers avoids much of the inconvenience attending the preceding. He uses what he terms a "deglutable stomach electrode," which is constructed on the same principle as his stomach bucket. This, containing the electrode, is swallowed, and, instead of the silk thread, a very fine rubber tube is attached to the bucket, through which a very fine, soft, conducting wire runs to the battery.

"The end piece of the electrode consists of a hard rubber capsule with many openings. In this capsule lies a metallic button, which is connected with the wire. The rubber capsule serves to avoid the direct contact of the metal with the stomach wall; the

* "Diseases of the Stomach" (second edition), p. 143, fig. 37.

circuit is completed by the water the stomach contains."

For a detailed account of the method of applying, by this means, directly to the stomach gastro-faradisation and gastro-galvanisation, we must refer to Max Einhorn's work.* He states that he has found the method valuable in non-malignant chronic diseases of the stomach, especially severe and obstinate gastralgia, cases of atonic non-obstructive dilatation of stomach, also cases of relaxation of the cardia (eructations) and relaxation of pylorus (presence of bile in stomach).

Another instrument has recently been devised for "internal massage" of the stomach by Dr. Fenton B. Turck, of Chicago. It is termed the *gyromele*, or revolving sound, and consists of a flexible cable, to the end of which is fixed a sponge covering a spiral spring. The cable passes through a rubber tube, which is attached to a revolving apparatus, for the purpose of producing revolutions of the sponge. Those who are not sceptical as to the fitness and value of these mechanical methods of treating the long-suffering stomach will find this instrument figured and described in Gillespie's "Manual of Modern Gastric Methods," pp. 132–134.

ADDITIONAL FORMULÆ.

To promote appetite (in atonic dyspepsia).

Tincturæ cascarillæ, ʒijss.
Tincturæ rhei, ʒijss.
Tincturæ nucis vomicæ, ʒvj.
Tincturæ gentianæ, ʒx.
Tincturæ aurantii ad ℥iv.

M. f. tinctura. Two teaspoonfuls, in water, a short time before a meal. (*Huchard.*)

For chronic dyspepsia with deficient gastric secretion.

℞ Acidi nitro-hydrochlorici diluti, ʒvj.
Liquoris strychninæ, ʒjss.
Tincturæ aurantii } āā ℥j.
Tincturæ calumbæ }
Infusi gentianæ ad ℥x.

M. f mist. A tablespoonful in a wineglassful of water three times a day after food.

* "Diseases of Stomach" (second edition), p. 147.

To promote appetite in dyspepsia.

℞ Ammonii carbonatis, ʒj.
Potassii bicarbonatis, ʒjss.
Infusi chiratæ ad ℥vj.
M. f. mist. A tablespoonful three times a day. (*Charteris.*)

In atonic dyspepsia.

℞ Extracti nucis vomicæ, gr. iv.
Extracti quassiæ, gr. xx.
Quininæ sulphatis, gr. xl.
M. et divide in pil. xx. One three times a day after meals. (*Hare.*)

Or

℞ Extracti chiratæ, gr. xl.
Extracti gentianæ, gr. xl.
Oleo-resinæ capsici, ♏ v.
M. et divide in pil. xx. One after each meal. (*Hare.*)

Powder for atonic dyspepsia.

℞ Sodii bicarbonatis exsiccatæ, gr. v.
Magnesii carbonatis, gr. x.
Pulveris rhei, gr. vj.
M. f. pulv. To be taken before meals three times a day.

Chloroform mixture for flatulent dyspepsia.

℞ Tincturæ anisi,* ʒij.
Aquæ floris aurantii, ℥iv.
Aquæ chloroformi (saturatæ) ad ℥viij.
M. f. mist. A dessertspoonful to be taken before or during a meal.

* French Codex.

For acid dyspepsia with pyrosis.

℞ Magnesiæ, gr. ij.
Bismuthi subnitratis, gr. v.
Pulvis opii, gr. ss.
M. f. pulv. To be taken before eating. (*Piorry.*)

Resorcin mixture for acute gastritis and dyspepsia.

℞ Resorcini (*pure white, bisublimated*), ʒss.
Acidi hydrochlorici puri, ʒss.
Syrupi aurantii, ʒv.
Aquæ destillatæ ad ℥vj.
M. f. mist. One tablespoonful every two hours. (*H. Menche.*)

For dyspepsia in infants born before term.

℞ Pepsinæ glycerini, ʒijss.
Acidi hydrochlorici diluti, ♏ x.
Aquæ ad ℥iij.
M. f. mist. A teaspoonful ten minutes after each meal. (*Prof. Monti, Vienna.*)

Alkaline powders for acid dyspepsia.

℞ Bismuthi subnitratis
Magnesiæ ponderosæ
Sodii bicarbonatis } ana ʒij ss.
M. Divide in pulv. xxx. One to be taken before meals. (*Dujardin-Beaumetz.*)

For flatulent dyspepsia.

℞ Tincturæ cardamomi compositæ, ʒiv.
Tincturæ zingiberis, ʒjss.
Spiritus ammoniæ aromatici, ʒij.
Spiritus chloroformi, ʒij.
Acidi hydrocyanici diluti, ♏ xl.
Aquæ carui ad ℥vj.
M. f. mist. A tablespoonful occasionally. (*Charteris.*)

For obstinate flatulence with pyrosis.

℞ Argenti nitratis, gr. iv.
Extracti nucis vomicæ, gr. iij.
Extracti lupuli, gr. xxiv.
M. et divide in pil. xij. One thrice a day. (*Barlow.*)

As a digestive in flatulent dyspepsia.

℞ Pancreatin
Sodii bicarbonatis
Magnesiæ ponderosæ } ana 3j.
Nucis vomicæ pulveris, gr. vj.

M. et divide in pulv. (or cachets), xx. One at the beginning of each meal.
(*H. Huchard.*)

Fleiner's treatment of hyperchlohydria.

2½ to 5 drachms of bismuth subnitrate suspended in water, and given through the œsophageal tube, when the stomach is empty, before breakfast, for 20 to 25 days.

Drops for flatulent dyspepsia.

℞ Chloroformi, ♏xl. ad lxxx.
Tincturæ anisi, 3ij.
Tincturæ nucis vomicæ, 3v.
Tincturæ gentianæ, 3ij.

M. Take ten to twenty drops in a little water, at least a quarter of an hour before a meal. (*H. Huchard.*)

For flatulent dyspepsia with dilated stomach.

℞ Hydrargyri perchloridi, gr. $\frac{1}{24}$.
Strychninæ sulphatis, gr. $\frac{1}{24}$.
Creasoti, ♏j. ad ij.

M. f. pil. To be taken before, between, or after meals.
(*Broadbent.*)

For offensive eructations (H_2S) in cases of gastric dilatation.

℞ Sodii sulphitis, gr. v ad x.
Sodii bicarbonatis, gr. xv.
Tincturæ nucis vomicæ, ♏xl.
Aquæ ad 3j.

M. f. haust. To be taken between meals. (*Broadbent.*)

Pills for flatulent dyspepsia.

℞ Asafœtidæ, gr. xxiv.
Pulv. rhei, gr. xij.
Ol. cajuputi, ♏vj.
Extracti anthemidis, gr. xij.

M. et divide in pil. xij. One or two to be taken at bedtime.

Tonic and antacid in the dyspepsia of the debilitated.

℞ Liquoris ammoniæ, ♏lxxx.
Tincturæ aurantii, 3j.
Infusi chiratæ ad 3viij.

M. f. mist. Two tablespoonfuls twice or thrice daily an hour before meals.

CHAPTER VIII.

DISEASES OF THE INTESTINES—THE TREATMENT OF ENTERALGIA OR COLIC.

Causes—Irritating Ingesta—Fæcal Concretions—Worms—Gall-stones—Imprisoned Gases—Cathartic Drugs—Exposure to Cold—Neurosal and Reflex Cases—Lead—Hysteria—*Symptoms* and Diagnostic Signs. *Indications for Treatment*—Relief of Pain—Opium—Enemata—External Applications—Purgatives—Castor Oil—Calomel—Hypodermic Injection of Morphine and Atropine—Use of Belladonna—Gouty Cases—Alkalies and Colchicum—*Colic in Infants*—Antacids, Carminatives, and Purgatives—Bromide of Potassium—Lime Water—Treatment of *Rheumatic* and *Hysterical* Forms—Creasote and Thymol in Habitual Colic—Massage—Quinine in Malarial Cases—Milk Diet—*Neuralgic* Cases—Galvanism—Arsenic—Valerianate of Zinc—Warm Clothing—*Lead Colic* and *Plumbism*—Sources of Lead Intoxication—Symptoms. *Treatment*—Prophylactic and Remedial—Aperient Sulphates—Castor Oil—Opium—Enemata—Belladonna—Potassium Iodide—Electricity. Additional Formulæ.

By **enteralgia**, or colic, is meant all those *painful* affections of the walls of the intestines which are not caused by inflammation or by any structural changes in them. It is an affection of the sensory nerves of the intestine, analogous to gastralgia, or to the neuralgic affections of other sensory nerves. It must, however, be remembered that the same cause which excites a colic may, if it is not removed, produce inflammation.

Enteralgia is not a *disease* or pathological entity, but rather a group of symptoms of a more or less definite character.

As to the **causes** of enteralgia, they may be of two kinds—first, those which act by setting up irritation of the peripheral ends of the sensory nerves, *i.e.* causes acting within the intestinal canal itself; and secondly, causes acting on the sympathetic nerve trunks passing to the intestine, either through reflex excitement, or through physical change in those nerves, as *e.g.* inflammatory thickening of their sheaths, or

any other change which produces an abnormal irritability in them.

A frequent cause of colic is the presence of some irritating substance in the intestine, as indigestible or poisonous articles of food, or mechanical distension as from the passage of gall-stones, of hard fæcal concretions, of masses of intestinal worms (*colica verminosa*). The distension of the bowel by *fæcal impaction* (*colica stercoracea*) may cause great irritation of the intestinal nerves from pressure on them. The retention of gas (*colica flatulenta*) from constipation is a common cause of colic, "the gas enclosed between an impacted fæcal mass below and a descending mass of fæces above gradually distends this circumscribed portion of bowel and excites severe pains, which, however, disappear as soon as the flatus escapes."* Flatulent colic is, however, more frequently produced by undigested fermenting ingesta, especially in infants; such articles of food, undergoing abnormal decomposition, produce flatulent distension of the bowel and traction upon the intestinal nerves. Mere excess of otherwise wholesome food may cause colic; or the habitual use of food containing some coarse, indigestible particles, as we have seen happen from the long continued use of coarse brown bread. Some cathartic medicines, such as "senna," are known to cause colicky pains.

Exposure to cold is a common cause of colic (*colica rheumatica*). It is difficult to understand precisely how this acts—probably in the same way as when an ordinary rheumatic myalgia or neuralgia is produced. It is probably either a reflex phenomenon excited through the impression of cold on the peripheral nerves, or it is caused by the retention in the blood of excrementitious substances which ought, ordinarily, to be eliminated by the skin, the excretory function of which has been suddenly arrested by the chill.

* Leube, in Von Ziemssen's "Cyclopædia of Practical Medicine," vol. vii., p. 460.

A *morbid state* of the sympathetic nerve trunks, or of their central connections, appears, in other cases, to be the cause of enteralgia, as in those rare instances of attacks of colic associated with disease of the spinal cord, or those connected with uterine, ovarian, renal, and other visceral affections. Lead colic seems to be, to a great extent, of this kind, as distinct anatomical changes have been found in the ganglion and nerve trunks of the sympathetic in acute cases.

Hysteria, the parent of many forms of neuralgia, is also a cause of intestinal neuralgia.

The **symptoms** of enteralgia vary very greatly in intensity, the pain being in some cases but slight, and in others so severe as to be almost unbearable. The attack will sometimes come on quite suddenly, at other times it may be preceded by nausea, slight griping pains, and flatulent commotion. The pain is usually most severe in the umbilical region, from which it may radiate into the flanks and groins. Firm pressure with the hand seems generally to afford a little relief; sometimes, however, this cannot be borne. When the pain is severe, it is accompanied with great restlessness, a pinched and anxious countenance; beads of cold sweat stand out on the forehead, with cold extremities, a slow and small pulse, and great general depression. The abdominal muscles are hard and tense, and participate in the spasm. By placing the hand on the abdomen spasmodic contraction of the intestines may be distinguished in some parts and flatulent distension in others. The attacks of pain are sometimes periodic; they are apt to cease suddenly, with a feeling of complete relief. This often occurs on the discharge of fæces or flatus from the bowels. Usually there is **constipation.** Other symptoms which may accompany the attacks of intestinal pain are vomiting, hiccough, dyspnœa, desire to micturate, giddiness, faintness, and, in young children, sometimes convulsions. In infants these attacks cause great restlessness, constant crying, and retraction of the limbs.

It is important to be able to distinguish the pain of colic from that of inflammatory affections of the intestinal mucous membrane and from disease of the appendix. This is not usually difficult; the sudden onset of severe pain, the absence of febrile symptoms, the relief afforded to the pain by firm pressure, the sudden disappearance of the pain on the escape of gas or the passage of a motion, and the history of previous attacks, will usually enable us to arrive at a correct diagnosis.

In searching for further **indications** for **treatment** we should note whether the attack has been preceded by vomiting of indigestible food, or by obstinate constipation, or if there is evidence of the presence of nodular masses of indurated fæces in the course of the large intestine; if there is much abdominal distension and commotion from locked-up flatus; if worms have been passed, or symptoms have been complained of pointing to their presence.

The *rheumatic* nature of such an attack may be inferred when it has occurred directly after exposure to chill, and from the absence of other causes.

From commencing *peritonitis* it may be difficult sometimes to separate it, especially in hysterical women; but the absence of thirst and fever, and the fact that deep pressure is not more painful than light superficial pressure, and the position of the patient, the legs being drawn up and the body kept still in peritonitis, whereas there is often much twisting about of the body in colic, will usually serve to distinguish between them.

It is necessary to see that there is no hernia or other evidence of organic obstruction.

If the colic is due to **lead** poisoning, the history will usually disclose this. The long-continued obstinate constipation, the presence of a blue line on the gums, the loss of power of the extensor muscles of the wrist, the scanty urine, and general dyscrasia are sufficiently characteristic.

With these preliminary considerations we may pass on to the **treatment** of enteralgia.

The **pain** of colic can almost always be relieved by *opium*, and it is to this drug the practitioner usually at first resorts. This is not, however, *always* commendable. It must be remembered that *opium* tends to arrest the intestinal secretions, and especially the outflow of bile; it lessens peristaltic action (one reason, indeed, for giving it), even to the extent, if it is pushed in large doses, of *paralysing* the muscular coat of the bowel. So that while it relieves the pain it does not remove the cause of the colic, which may be, and frequently is, the presence of offending ingesta or of old fæculent accumulations in the intestines.

It is far better and safer practice, unless we have good reason to know that there are *no* offending substances or fæculent accumulations in the intestine, to administer at once a large enema of warm soap and water (from 1 to 2 pints), with which we should mix 1 or 2 tablespoonfuls of castor oil, and, in cases of flatulent distension, a tablespoonful of spirits of turpentine. If the first enema comes away without affording much relief, another should be given after half an hour. At the same time a hot flannel or linseed poultice sprinkled with laudanum may be applied to the abdomen, or the surface of the abdomen may be rubbed with opium or belladonna liniment, and at the same time gently kneaded with the warm hand in the direction and along the course of the large intestine. There is not the same objection to the external use of opium as there is to its internal administration. If the enema, repeated two or three times, fails to relieve, we may conclude that the large intestine does not contain any fæcal accumulation, an inference which would be corroborated by percussion over the cæcum and colon. In this case we should give some mild cathartic by the mouth, such as a tablespoonful of castor oil, or, if this is rejected by vomiting, 4 or 5 grains of calomel may be

thrown on the tongue, and if the pain is still severe, a small dose of morphine ($\frac{1}{6}$ or $\frac{1}{8}$ grain) combined with it; or 5 or 10 minims of the liquor opii sedativus may be added to the castor oil, and this dose may be repeated after two hours if necessary.

If the pain is so severe as to point to persistent spasmodic contraction of the small intestine or to some intrinsic lesion of the intestinal nerves, it may be advisable to administer hypodermically $\frac{1}{6}$th to $\frac{1}{3}$rd of a grain of morphine with $\frac{1}{120}$th to $\frac{1}{60}$th of a grain of atropine.

The use of opium is chiefly valuable for relieving intestinal spasm, and when it does this it may actually promote and assist the action of aperients on the small intestine. It is not, therefore, to this rational use of opium that we object, but to the routine and excessive use of this drug, which we believe not unfrequently converts a comparatively unimportant colic into a serious case of obstruction, by paralysing the abdominal walls. It is best, therefore, to cure an attack of colic without opium, if possible, and in that case the cure (with evacuants) will be speedy and complete.

It has been objected that aperients in these cases are apt to increase intestinal spasms, especially if given alone, but this objection cannot apply to *enemata*, with which the treatment of these cases should always be begun.

In cases where there is great intolerance of pain, one initial dose of opium (or a hypodermic injection of morphia) may be given at the same time that efforts are made to evacuate the bowels by enemata.

There is not the same objection to the use of belladonna and atropine in these cases as there is to that of opium and morphine; there is reason to believe that atropine lessens or removes the irritability of the intestinal nerves, and so relieves intestinal spasm as completely as opium without locking up the contents of the bowel and arresting biliary and other

intestinal secretions, as opium does. We may, therefore, prescribe a warm carminative mixture containing belladonna, such as :—

℞ Tincturæ belladonnæ ♏ xxxxv.
Tincturæ cardamomi compositæ ʒvj.
Spiritus ammoniæ aromatici } āā ʒij.
Spiritus chloroformi }
Sodii bicarbonatis ʒj.
Aquæ carui ad ℥vj.

Misce, fiat mistura. Two tablespoonfuls every hour until relieved.

At the same time we should give enemata. Or we may at once give $\frac{1}{60}$th of a grain of atropine hypodermically.

In cases which appear to be of a **gouty** nature, *i.e.* occurring in persons who are known to be the subjects of gouty manifestations, we must give warm alkaline medicines and an aperient pill with colchicum each night for a few nights, as the following :—

℞ Ammonii carbonatis gr. xl.
Sodii bicarbonatis gr. lxxx.
Spiritus chloroformi ʒiij.
Tincturæ zingiberis ʒss.
Aquæ cinnamomi ad ℥viij.

Misce, fiat mistura. Two tablespoonfuls with one of hot water every three or four hours.

℞ Extracti colchici gr. ss.
Pilulæ rhei compositæ gr. iv.

Fiat pilula. To be taken every night.

In *infancy* the colic is very frequently caused by unduly irritating acid contents of the intestine from abnormal decomposition of food, and this is accompanied with painful distension of the intestines with flatus. Such cases are best relieved by an antacid aperient and carminative mixture such as the following :—

℞ Pulveris rhei compositæ ʒj.
Spiritus ammoniæ fœtidi ʒss.
Tincturæ cardamomi compositæ ʒiij.
Spiritus chloroformi ʒss.
Aquæ carui ad ℥jss.

Misce, fiat mistura. A teaspoonful or two according to age every hour until relieved.

If there is decided constipation, a dram or two of castor oil may be given or a grain of calomel may be thrown on the tongue and washed down with the first dose of the above mixture; and if there seems to be much painful spasmodic contraction of the intestine, half a grain or a grain, according to the age of the child, of compound ipecacuanha powder should be mixed with the calomel; that would be $\frac{1}{20}$th or $\frac{1}{10}$th of a grain of opium. If there should be a difficulty in getting the child to take medicine by the mouth, a clyster containing an emulsion of castor oil and a little oil of rue should be thrown up into the bowel. The following is a suitable formula:—

℞ Olei ricini ʒj ad ʒiij.*
Olei rutæ... ♏ij ad ♏vj.
Potassii carbonatis gr. v. ad xv.
Aquæ ad ʒij ad ʒiv.

* According to the age of the child.

This must be given with a rather long tube, or it may not be retained. If, after free evacuation of the bowels, there is still pain and distress, 1 or 2 minims of tincture of opium (if the child is over six months) may be given in 1 or 2 ounces of starch emulsion as an enema.

Ringer speaks of a form of colic in young children which is only relieved by bromide of potassium; the belly is retracted and hard, or the intestines "at one spot are visible, contracted into a hard lump, the size of a small orange," which can be felt "travelling from one part of the intestine to another." These attacks are, he says, "unconnected with constipation, diarrhœa, or flatulence." They cause "excruciating pain," and are sometimes "associated with a chronic aphthous condition of the mouth." Two to five grains of bromide of potassium or sodium may be given every hour in a dram of dill-water.

In colic in suckling children caused by the indigestion of milk, lime water with which a few grains of calcined magnesia have been mixed should be

given after suckling to prevent the coagulation of the milk.

In attacks of colic due to **chill**, or of a rheumatic nature, hot applications to the surface of the abdomen are most useful, hot flannels sprinkled with turpentine or hot linseed-meal or bran poultices, after friction with opium or belladonna liniment. Warm drinks are also useful to promote diaphoresis, such as a breakfast-cupful of gruel, with a tablespoonful of brandy. A full dose of Dover's powder, 10 to 15 grains, should be given at bed-time, and some mild saline aperient the next morning, such as sodium sulphate or phosphate, one or two teaspoonfuls, in half a tumblerful of hot water every hour until the bowels are relieved. A flannel band should be always worn round the abdomen to prevent recurrences of the attack. In chronic cases of this kind iodide of potassium or salicine may be found useful.

In **hysterical** cases, usually attended with great flatulent distension, antispasmodic enemata are very serviceable, in combination with aperients. Four ounces of the *enema asafœtida* may be mixed with 4 ounces of the *enema aloes* and 4 ounces of warm soap and water, and administered with a long tube; or an enema may be made with 5 minims of *oil of rue* mixed with 2 drams of *ammoniated tincture of valerian*, and then added to 10 ounces of warm *infusion of valerian*. One or two drops of cajuput oil on a lump of sugar may be taken internally to relieve flatulence. Five grains of the aloes and asafœtida pill may be given night and morning; or better still, a pill containing 1½ grain of powdered aloes, 1 grain of asafœtida, 1 minim of oil of cloves, and a grain of powdered soap.

If we have evidence that the colic is caused by **intestinal worms**, we must give the remedies necessary for their displacement.

One of the best remedies for slight but *habitual* flatulent colic is creasote or menthol; either of these

remedies given immediately or soon after food prevents undue fermentation and development of gas. Half a minim of creasote or 1 grain of menthol may be made into a pill with 2 grains of powdered rhubarb and 1 of soap, and taken after each meal. Abdominal massage is also useful in these cases. In cases that can be distinctly traced to malarial influence quinine in full doses must be given; or arsenic if quinine cannot be tolerated.

A strict *milk diet* will cure some obstinate cases by removing all possible sources of irritation from imperfect digestion of food.

In the *purely* **neuralgic** cases more difficulty will be encountered in obtaining speedy relief. The anodyne remedies already mentioned will, in most cases, afford temporary relief, but for permanent cure we shall probably be obliged to have recourse to other means.

The general indications for treatment applying to other forms of neuralgia will apply in these cases also. Galvanism has proved very useful, and is highly commended by Leube, especially for the relief of meteorism. Arsenic has been strongly recommended, especially by Clifford Allbutt, in the treatment of neuralgic colic. In some exceptional cases, when the flatulent distension has been extreme, good results have followed puncture of the distended colon with a fine trocar, or with an exploring needle.

Valerianate of zinc, 1 grain three times a day, has proved useful in enteralgia arising reflexly in connection with uterine disease.

Persons prone to attacks of colic should be particularly observant in their diet, and carefully avoid those articles of food which appear to predispose to the attack. They should also clothe warmly, and wear a flannel belt round the abdomen; they should avoid sedentary habits, as well as any great fatigue or exhausting efforts, bodily or mental, and they should never suffer the bowels to become constipated.

The management of cases of **lead colic** requires special consideration.

Although lead colic as well as other symptoms of lead poisoning occur incidentally and occasionally from the introduction of lead compounds into the body in water, food, alcoholic beverages, hair dyes, snuff, etc., yet it is chiefly amongst the workers in lead factories that its severe characteristic forms are so frequently encountered. Plumbers and painters, also, from the necessity in their occupations of coming much into contact with lead, are prone to suffer from plumbism. Whenever we encounter the symptoms of lead poisoning, in others than those who are known to be brought into contact with this metal, or its compounds, in their occupation, it is necessary to make a very close inquiry—first, into the source of their water supply, and, if this is found free from all possible contamination, secondly, into all the sources and modes of preparation of all the articles of food and drink consumed. Wine, cider, sour milk, beer, ginger-beer, lemonade, hair dyes strongly impregnated with lead, have all, at times, been found to give rise to lead colic. Flour, bread, and cakes have also been found to contain lead, and to give rise to plumbism.

The symptoms of acute lead colic are thus described by Oliver* :—

"The patient is suddenly seized with an acute pain in the abdomen. Confined to the region of the umbilicus, sometimes a little above it, but more frequently to the left, the pain is either of a twisting or grinding nature, or it creates a sense of weight and constriction. These pains are simply excruciating. Sometimes the patient receives relief from pressure, sometimes from warmth; at other times he is unable to be touched. The colic subsides, only to recur in paroxysms, and with a tendency to nocturnal exacerbation. Generally, after the acuteness of the pain

* "Lead Poisoning in its Acute and Chronic Form." Young J. Pentland. 1891.

has subsided, nausea, retching, or vomiting of a thin, greenish liquid occurs, accomplished with difficulty, and accompanied by restlessness. The secretion of the urine is diminished, and the pulse is hard and slow. In such a case under treatment, the pain, gradually subsiding in severity, keeps returning in milder and milder paroxysms; the vomiting abates, the bowels yield to purgatives, the spirits improve. In a few days the patient is convalescent." Together with these painful abdominal symptoms we observe other general symptoms of *plumbism*—pallor and sallowness of the complexion with anæmia, pinched features, a small, rapid pulse, a characteristic *blue* line on the gums, a metallic taste in the mouth, headache, weakness in the limbs, sometimes extreme wasting of the extensor muscles of the hands and "*dropped wrists*," loss of appetite, and most obstinate constipation. With other symptoms of plumbism we are not at present concerned.

The **treatment** of lead colic may be prophylactic or remedial. For the former purpose we should carefully see that in the storage and conveyance of drinking water it should come into contact not at all, or as little as possible, with the metal lead, nor should any ordinary foods or beverages be stored up or wrapped in leaden receptacles or envelopes. When it has been found impracticable to prevent altogether the contact of drinking water with lead, the addition of carbonate of lime in the proportion of 2 grains to the gallon causes a protective coating to form on the interior of the pipe, and the risk of lead poisoning is thus greatly diminished, or wholly prevented. Silica acts in the same way. Persons employed in lead factories should be regularly examined for symptoms of plumbism, and when any of these are detected those persons should at once be suspended from work. As in white lead works the powder enters the body commonly by inhalation through the respiratory organs, or from want of cleanliness in feeding, the powder collecting on the hands being conveyed with the

food into the mouth, obvious precautionary measures are to insist on the operatives wearing suitable respirators, and bathing the body, and especially carefully washing the hands before taking food. Sulphuric acid lemonade, a drink acidulated with sulphuric acid, and sweetened with sugar, or a drink of sulphate of magnesia (!), acidulated with sulphuric acid, is kept in most lead factories, and the workers are encouraged to drink it in the belief that any soluble compounds of lead that might reach the stomach would be thus converted into the insoluble sulphate, and so be rendered harmless. Such drinks certainly have a preventive influence, but the workers cannot be induced to drink them as freely as desirable. This can readily be understood if the bitter and unpleasant sulphate of magnesia is added to them.

Oliver * considers "that no man or woman should be allowed to begin the toil of the day without having had a substantial meal, experience and experimental investigation having shown that during the process of digestion little or no lead is dissolved and absorbed." He also thinks that "total abstinence is a physiological necessity" to lead workers.

The **medicinal** treatment must correspond to the following indications:—(1) To relieve the constipation and pain; (2) to promote the elimination of the lead from the body. In response to the *first* indication, it is usual to give the aperient sulphates in combination with sulphuric acid, for not only do they, as purgatives, relieve the constipation, but as sulphates they precipitate any soluble salts of lead there may be in the intestinal canal in the form of the insoluble sulphate. Castor oil also may be given, but the sulphates are preferable. Should the pain be very severe, a hypodermic injection of morphine ($\frac{1}{4}$ grain) and atropine ($\frac{1}{60}$ grain) may at the same time be given; or an opiate and belladonna liniment

* *Op. cit.*

(lin. opii, lin. belladonnæ, āā ½ ounce) may be rubbed in freely round the navel, or a large warm enema of soap and water, one or two pints, may be given, with which 1 ounce of castor oil, ½ an ounce of turpentine, and 20 minims of laudanum should be mixed.

The following mixture of aperient sulphates may be prescribed:—

℞ Magnesii sulphatis } āā ℥jss.
Sodii sulphatis }
Acidi sulphurici aromatici ℥j.
Syrupi zingiberis ℥ss.
Aquæ cinnamomi ad ℥xij.

Misce, fiat mistura. Four tablespoonfuls every hour until the bowels are completely relieved.

The action of this mixture should be aided by large enemata if necessary. The aperient doses may be repeated as required.

Belladonna has been found very efficacious in the relief of lead colic by some physicians. Small doses (⅛ to ¼ grain of the extract) should be given frequently, every hour or half-hour, and the doses should be increased until the full physiological effect of the drug is established.

Rectal injections of ether vapour have been found useful in lead colic. An india-rubber tube is passed into the rectum and connected with a flask containing ether, which is placed in hot water. Relief is usually obtained after the vapour of about 15 minims of ether has passed into the bowel. A dose of castor oil should then be given.

To fulfil the *second* indication, viz. to procure the **elimination** of the poison, potassium iodide must be given. This salt forms a soluble compound with the lead deposited in the tissues, which is then re-absorbed into the blood, and eliminated by the kidneys. The presence of lead in the urine may be detected soon after the administration of the iodide. It may be combined with sulphate of magnesia.

The following is an excellent formula, to be prescribed after the relief of the severe colic:—

℞ Potassii iodidi gr. xl.
Magnesii sulphatis ℥j.
Tincturæ nucis vomicæ ℥v.
Aquæ cinnamomi ad ℥viij.
Misce, fiat mistura. Two tablespoonfuls night and early morning.

So rapid is the solvent action of the iodide in many cases that Oliver calls attention to a certain amount of risk attending its use when there is a large amount of lead deposited in the tissues; he has known the general symptoms of plumbism to increase under its influence, and sudden death to occur, "due in great measure to the rapid entrance into the blood of a large amount of soluble lead salt." Caution must, therefore, be observed in its use.

ADDITIONAL FORMULÆ.

For colic.

℞ Pulveris rhei, ʒss.
Tincturæ rhei, ʒjss.
Magnesii carbonatis, ʒj.
Tincturæ opii, ♏x.
Spiritus anisi, ♏vj.
Spiritus menthæ piperitæ, ʒij.
Aquæ ad ℥vj.
M. f. mist. A tablespoonful three times a day. (*Napheу.*)

For flatulent colic.

℞ Spiritus chloroformi, Tincturæ cardamomi compositæ ana ʒij.
M. f. mist. A teaspoonful every half-hour in water.
(*Bartholow.*)

For the pain of colic.

℞ Chloroformi, ʒj.
Morphinæ acetatis, gr. jss.
Olei anisi, guttæ viii.
Olei menthæ piperitæ, guttæ viii.
Syrupi acaciæ, ʒij.
Aquæ camphoræ ad ℥ij.
M. f. mist. A teaspoonful for a dose. (*Ludlow.*)

Enema for flatulent colic.

℞ Olei terebinthinæ, ℥j.
Pulveris amyli, q.s.
Decocti hordei ad ℥xx.
M. f. enema. (*Hooper.*)

Aperient draught for colic.

℞ Olei ricini, ʒvj.
Tincturæ rhei, ʒj.
Tincturæ opii, ♏xij.
Aquæ cinnamomi ad ℥ij.
M. f. haust. To be taken immediately. (*Whitla.*)

For flatulent colic in women.

℞ Spiritus ammoniæ aromatici, ʒiij.
Spiritus chloroformi, ʒij.
Tincturæ zingiberis, ʒj.
Tincturæ belladonnæ, ʒjss.
Aquæ menthæ piperitæ ad ℥xj.
M. f. mist. Two tablespoonfuls every four hours.
(*Therap. Gaz.*)

For colic and restlessness in infants.

℞ Potassii bromidi, ʒj.
Olei anisi, ♏ij.
Mucilaginis acaciæ, ʒij.
Aquæ menthæ piperitæ ad ʒij.

A teaspoonful every ha'f-hour until relieved.

Draught for flatulent colic with constipation.

℞ Olei cajuputi, ♏iv.
Sacchari albi, gr. x.
(Tere et adde)
Tincturæ jalapæ, ʒj.
Decocti aloes compositi ad ʒjss.

M. f. haust.

For colic from impacted fæces.

℞ Strychninæ, gr. j.
Extracti belladonnæ, gr. iij.
Podophyllin, gr. iv.
Pulveris ferri sulphatis, gr. xx.
Aloes, socotrinæ, gr. xx.
Syrupi, quantum sufficiat.

M. et divide in pil. xx. One every eight hours.

(*Montgomery.*)

For infantile colic.

℞ Magnesii carbonatis, gr. xx.
Syrupi zingiberis, ʒiij.
Spiritus chloroformi, ♏xx.
Aquæ anethi ad ʒij.

M. f. mist. A teaspoonful every hour if necessary.

For severe colic in infants.

℞ Tincturæ cascarillæ, ♏x.
Tincturæ krameriæ, ♏x.
Olei anthemidis, guttæ j ad ij.
Syrupi simplicis, ʒijss.
Aquæ ad ʒij.

M. f. mist. A teaspoonful every two hours.

(*Prof. Widerhofer, Vienna.*)

Enema aloes.

℞ Aloes, 40 grains.
Carbonate of potassium, 15 grains.
Mucilage of starch, 10 oz.

Mix for one enema.

Mixture for infantile colic.

℞ Spiritus ammoniæ fœtidi, ♏x.
Olei anisi, ♏iv.
Tincturæ opii, ♏iij.
Magnesii carbonatis, gr. xx.
Pulveris rhei, gr. x.
Syrupi simplicis, ʒj.
Aquæ ad ʒij.

M. f. mist. One or two teaspoonfuls every three hours.

(*Brereton.*)

Alum mixture for lead colic.

℞ Aluminis, ʒij.
Acidi sulphurici diluti, ʒj.
Syrupi limonis, ʒj.
Aquæ ad ʒiv.

M. f. mist. A tablespoonful every hour or two. (*Bartholow.*)

For the constipation of lead colic.

℞ Magnesii sulphatis, ʒj.
Acidi sulphurici diluti, ʒj.
Aquæ ad ʒiv.

M. f. mist. A tablespoonful every three hours. (*Bartholow.*)

Mixture for flatulent colic.

℞ Magnesii levis, ʒss.
Olei cajuputi, ʒss.
Spiritus ammoniæ aromatici, ʒij.
Tincturæ cardamomi compositæ, ʒiv.
Aquæ ad ʒvj.

M. f. mist. One or two tablespoonfuls for a dose (one or two teaspoonfuls for a child).

Enema asafœtidæ.

℞ Asafœtidæ, 30 grains.
Distilled water, 4 oz.

Rub the asafœtida with the water, added gradually so as to form an emulsion, for one enema.

CHAPTER IX.

DISEASES OF THE INTESTINE—THE TREATMENT OF HABITUAL CONSTIPATION.

Causes—Faulty Dietetic Habits—Insufficient Ingestion of Water—Defective Secretion of Bile—Loss of Muscular Tone in the Intestinal Walls—Negligence to solicit Action of Bowels. *Symptoms*—Dyspeptic Troubles—Headache—Defective Nutrition—Depression of Spirits—Restlessness—Pressure Symptoms—Circulatory and Neurosal Disturbances—*Treatment—Indications*—(1) *Dietetic*—Water—Fresh Vegetables and Fruits—Oatmeal, etc.—Fats and Oils—Grapes—Linseed—(2) *Regimenal*—Exercise—Gymnastics—Massage—Cold Affusions and local Douches—Electricity—Abdominal Belt—(3) *Medicinal*—Saline and other Purgatives—Enemata—Mechanical Removal of Indurated Masses—Glycerine Injections—Cholagogues—Calomel—Podophyllin—Dinner Pills—Bitter Waters—Carlsbad Salts—Courses of Mineral Water—Hydrotherapy—Belladonna—Opium—Nux Vomica and Tonics. Additional Formulæ.

CONSTIPATION, for our present purpose, must be regarded simply as an abnormally prolonged retention of the fæces, or their habitual expulsion with difficulty and in defective quantity; and this is usually accompanied by more or less disturbance of the general health.

In considering the **causes** of habitual constipation with a view to its successful treatment, we must, *in the first place*, point out how often it depends on faulty **dietetic** habits, especially in the addiction to too highly concentrated foods, and to the too sparing use of water. A diet composed almost exclusively of easily digested animal food will leave but little waste as a result of its digestion, and so produce constipation by not supplying that stimulus to the nerves of the intestinal mucous membrane which a normal amount of indigestible residue would do. Constipation may also follow the use of articles of food leaving too highly stimulating a residue, the repeated contact of which finally exhausts

the excitability of the intestinal walls. Often too **dry** a diet may be the cause of constipation; the water taken being in insufficient quantity to keep the contents of the intestinal canal in a fluid, semi-fluid, or soft condition; the freer also the supply of water to the blood the more abundant and fluid the intestinal secretions are likely to be; whereas a defective supply of water will naturally diminish the amount of the fluid secreted by the intestinal glands. A comparatively dry condition of the intestinal canal is thus induced, and the progress of the residue of the food along it is thereby retarded.

The same result will follow the excessive loss of fluid through the skin, kidneys, or lungs, if this loss be not compensated for by an adequate increase in the water ingested. Excessive muscular exertion, or exercise, in persons disposed to perspire freely, may thus contribute to the constipated habit, and we must bear this in mind when prescribing exercise for its cure, or in ordering Turkish baths. Diabetes, and certain nervous states, attended with an excessive flow of urine, hyper-lactation causing a loss of water from the blood through the mammary glands, and feverish states, which increase both cutaneous and pulmonary transpiration, as well as lessen intestinal secretion, all tend to produce constipation.

An exclusive milk diet, as well as so-called "fasting" cures, causes constipation by leaving an insufficient residue to excite intestinal peristalsis. Too great *uniformity* in diet will tend to have the same effect by leading to diminished sensibility of the intestinal canal.

Secondly: Deficiency of the intestinal secretions—of *bile* and intestinal juices, irrespective of dietetic habits, may cause habitual constipation. In many persons there would seem to be a constitutional tendency to defective secretion of bile and the intestinal juices, just as in others there is a tendency for the cutaneous secretion to be defective.

Thirdly: Chronic constipation may be due to a

want of tone, a loss of muscular propulsive power in the intestinal walls, either from defective nutrition, or imperfect innervation, or from intrinsic structural changes. Under this head we include the cases which depend on bodily inactivity and insufficient exercise in the open air, associated with sedentary habits, or too exclusively intellectual occupations, or from whatever other cause. Hysterical, anæmic, and hypochondriacal states, although often, to some extent, *effects* of constipation, may also contribute to *cause* this state by the defective innervation and nutrition of the muscular system generally which they induce. We may also here include those cases of constipation dependent on paralysing lesions of the spinal cord, which affect not only the motor nerves of the intestinal canal, but also those of the abdominal muscles.

Or the loss of tone may depend on structural changes in the intestinal walls; as an œdematous condition from chronic renal or cardiac disease or degeneration or wasting of the muscular coat, as in convalescence from exhausting fevers, and in the cachexia of many chronic diseases, as well as in senile degeneration.

Fourthly: A common cause of chronic constipation is a habit of indolence or carelessness in neglecting to solicit a regular periodical evacuation of the bowels. The natural impulse to defæcation is at first disregarded, the sensibility of the rectal mucous membrane is thereby blunted, considerable accumulations occur in the rectum and sigmoid flexure of the colon, and many days often pass without a stool. Women are especially addicted to this injurious habit. Occasionally it is dependent on some painful condition of the anus (fissure, eczema, etc.), and the natural impulse to evacuate the bowel is voluntarily resisted in dread of the pain caused by a motion.

Fifthly: It has been pointed out that women are more prone to constipation than men, not only on account of their more sedentary habits and indolent

disregard of the calls of nature, but also from organic causes. "At every menstrual period the uterus enlarges and exercises a greater compression on the rectum. A tender and enlarged ovary (and at the menstrual epoch the ovary is always tender and enlarged) exercises an inhibitory action upon the muscles which bring the fæces in contact with it in their downward passage. In the married woman recurring pregnancies lead to the habit of constipation from the long continued pressure upon the colon, sigmoid flexure, and rectum, from the extreme stretching of the abdominal muscles, and from the paralysing effect of compression during labour. The relaxed condition of the pelvic and abdominal organs after labour offers no resistance to the distension of the rectum and sigmoid flexure. The cessation of the catamenia is accompanied with constipation, nervousness, and a feeling of ill-defined apprehension when the bowels are moved, or abdominal pains deter many persons, chiefly women, from habits of regularity. All uterine and ovarian derangements by mechanical or reflex means bring about the same result."*

On the other hand, habitual constipation tends to produce in women hyperæmia of the uterus, with menorrhagia and uterine catarrh, and even more serious disease of that organ.

Habitual constipation is often accompanied by a disagreeable train of **symptoms**, which may here be briefly enumerated (some of these are probably due to the mechanical and obstructing effects of the retained fæces, and others to the absorption into the blood from the intestinal surface of toxic substances resulting from putrefactive changes in the retained excrement): loss of appetite, coated tongue and bad taste in the mouth, impaired digestion, flatulent distension and oppression causing palpitation and dyspnœa, defective nutrition, wasting and anæmia, headaches, flushing of the face, spots before the eyes,

* Professor W. W. Johnstone's article "Constipation," Pepper's "System of Practical Medicine," vol. ii., p. 640.

great depression of spirits and irritability of temper, the sleep disturbed by dreams and the nights restless. Cutaneous eruptions sometimes appear.

Owing to local pressure of the retained fæces on the vessels and nerves in the neighbourhood of the rectum and sigmoid flexure, we may, occasionally, get œdema of the feet (from pressure on the iliac veins), but more commonly *cold* feet, hæmorrhoids (from pressure on hypogastric veins); men may have troublesome erections and seminal emissions (from pressure on the pudic veins), and sciatica, and neuralgic pains in the legs, and a feeling of numbness due to pressure on the nerves of the sacral plexus. A *feverish* state is not uncommonly induced in some cases of habitual constipation, the temperature rises to 101° or 102° F. (some physicians have observed much higher temperatures); with this rise of temperature there are usually a dirty tongue, a bad taste in the mouth, high-coloured urine, complete loss of appetite, and great physical and mental depression. These symptoms are, no doubt, caused by the absorption of toxins developed in the retained fæces. The *fever* may last a considerable time, even if the bowels are well acted upon, and the loss of appetite often lasts much longer.

The **treatment** of habitual constipation must respond to the following indications:—

1. A suitable regulation of the diet and regimen.
2. An enforcement of healthy habits of life.
3. The adoption of such remedial measures (medicinal or other) as shall immediately overcome the existing constipation, and prevent its recurrence; the latter by improving the digestion, promoting intestinal secretions, and giving tone to the intestinal walls.

And (1), *as to* **diet.**

When we have reason to think an insufficient amount of water is taken, that deficiency must be supplied. A tumblerful of cold water should be drunk slowly while dressing in the morning, again on going to bed at night, and half an hour before dinner—the

latter may, preferably, be taken hot. This water should be as free as possible from lime-salts; slightly mineralised effervescing waters will also serve the purpose, such as Seltzer water, Apollinaris water, etc. Beverages containing tannin should be avoided —such as certain red wines, strong tea, etc. It is on this account that China teas are so much more wholesome than Indian and Ceylon teas, which contain a much larger amount of tannin. Brown or rye bread, fresh vegetables—spinach, sorrel, beet-root, watercress, salads, plainly boiled Spanish onions—and ripe fruits should form a regular part of the diet; plums, prunes, grapes, figs, baked apples, stewed pears, oranges, bananas—foods leaving a considerable amount of undigested residue which exercises a stimulating action on the intestinal walls, and increases the bulk of the fæces. But it is an error to irritate the bowel by too large quantities of coarse and indigestible substances. The amount of animal food should be limited, and the proportion of vegetable food increased. An excess of eggs, milk, and farinaceous foods, as they leave but little indigestible residue, must be avoided. Although milk by itself is constipating, it is not so when mixed with coffee, and the stimulating influence of a cup of *café au lait* on rising in the morning will often produce a laxative effect. Maize and oatmeal are slightly aperient, and may be taken with advantage. Honey and treacle are also slightly laxative, and may be taken with oatmeal porridge or with brown wholemeal bread. Gingerbread which is made with honey is decidedly laxative. Honey and marmalade, eaten with bread and butter, are good for this purpose. A due proportion of fats and oils is also beneficial, as to some extent they escape digestion in the small intestine, and serve to lubricate and soften the fæculent mass which passes into the large intestine. Plenty of fresh butter is, therefore, useful, and so, too, is olive oil taken freely with salads; or a dessertspoonful of this oil may be mixed with potato, beetroot, or other

vegetable at meals. The laxative effect of 4 to 6 lbs. of grapes taken as a "grape cure" daily, has been found of value in overcoming chronic constipation.

Linseed—such as linseed-tea is made with—has been recommended by some French physicians as a good remedy for habitual constipation. A little water is poured on a dessertspoonful or tablespoonful of linseed, allowed to stand for one hour, and the whole drunk immediately before a meal.

When from defective appetite or painful digestion an insufficient quantity of food is taken to yield the necessary stimulus to peristaltic contraction in the intestinal canal, measures must be directed to removing the dyspepsia and improving the appetite.

(2) The enforcement of **healthy habits** of life is of great importance. Physical inactivity, from indolence or from too studious habits, or from too assiduous devotion to sedentary occupations, is a fruitful cause of habitual constipation, and in all such cases an adequate amount of regular exercise should be insisted upon.

Bodily exercise is a means of exciting peristaltic action in most persons (provided it is not attended by such profuse perspiration as to lead to an excessive loss of water by the blood). Respiration is thereby accelerated, the action of the diaphragm and abdominal muscles is increased, and the circulation of the blood promoted; at the same time the tone of the intestinal muscles is improved, and in this way peristaltic action is quickened.

The influence of bodily exercise may be aided by methodical abdominal massage and suitably devised gymnastics.

The following is the method that should be pursued in applying abdominal massage for the cure of constipation:—Begin by kneading the abdominal integuments and muscles, pressing gently over the cæcum with the tips of the fingers (palmar surfaces); then, by means of the closed fists, we should apply gentle but deep massage along the whole course of the

colon. The patient should empty the bladder beforehand, and the process should not last longer than from 15 to 20 minutes each time.

The medical attendant should at first apply or, at any rate, supervise this massage himself, as it is important that the operator should know the course and relations of the colon so as to apply pressure in the right direction; otherwise more harm than good may result from abdominal massage.

The importance of habitually soliciting an action of the bowels periodically, *i.e.* at a given hour daily, should be in all cases pointed out. This is particularly necessary with young girls at the age of puberty, when they are apt to be very neglectful in this respect, and so lay the foundation of much future trouble through inattention to the daily evacuation of the bowels. The daily habit of cold sponging, or bathing, with friction of the surface, is of much use, and this may be reinforced by cold douches or cold affusion, or the application of cold compresses to the abdomen. Prof. Turck has suggested *ice-massage* of the abdomen, to be applied after the patient has taken a hot bath—as hot as he can bear. The whole of the abdomen is then rubbed and massaged with a cake of ice placed in a suitable rubber-bag. The stomach, intestines, and solar-plexus are thus powerfully stimulated. Measures of this kind, when persevered in, have proved successful in curing obstinate cases of constipation, especially when dependent on atony of the intestine.

Perineal and anal douches have also proved useful by exciting locally the muscles of defæcation.

Any habitual pressure from tight clothing round any part of the abdominal cavity should be rectified.

We are not greatly in favour of electrical treatment or treatment by Swedish movements, unless in very obstinate cases with fæcal retention that cannot be relieved by other measures. These two modes of treatment have seemed to us to make patients far too dependent on their continued application, and to

foster that morbid introspective attention to their bodily sensations which they are already too prone to, and which is, in itself, a malady. Where, however, the constipation seems to depend on feebleness of the abdominal muscles and great loss of intestinal tone, the regular application of the interrupted current may be of use in promoting their better nutrition. In such cases, especially after repeated pregnancies, the wearing of a well-fitting elastic *abdominal belt* should be insisted upon.

(3) Finally, we have to consider the **medicinal** measures that may be effectual in curing constipation. Accidental or *occasional* constipation is usually readily overcome by some simple aperient dose. One of the most effectual is a pill composed of ½ a grain of calomel, 2 grains of extract of aloes, and 1 grain of extract of henbane, to be taken at bed-time, and 2 drams of sodium sulphate or phosphate in a tumblerful of hot water the first thing the following morning. This is a very effectual dose, which rarely causes any griping and relieves the bowels completely. A seidlitz powder in a large tumblerful of cold water early in the morning for the next few days will usually be all that is needed to restore regularity to the bowels in such cases of occasional and accidental constipation.

Castor oil is another useful aperient drug for occasional use, and has the advantage of acting, as a rule, quickly. From ½ a teaspoonful to a tablespoonful may be given as a dose, according to the age or susceptibility of the patient, in warm milk or a little brandy and water.

The medicinal treatment of *habitual* constipation is, however, more difficult. Whenever it is easy or possible to overcome the habit of constipation by simple measures without recourse to drugs, these should certainly be avoided; but in very many cases it will certainly be necessary to use some medicinal aids to initiate a more healthy action of the bowels, and no good can arise from needlessly

alarming patients about the injurious effects of laxatives.

At the outset, then, it is most important to completely clear the intestinal canal of all fæcal accumulations, and to ascertain by suitable manipulation that the large intestine, throughout its entire course, is thoroughly emptied and contracted, and not the seat of dry and hard retained fæcal masses. For this purpose such a dose as we have just suggested may be given for three or four consecutive days, or until by examination of the motions and by palpation and percussion of the abdomen we are satisfied that no fæcal accumulations have been left behind. If, however, we perceive evidence of hard lumps remaining in the large intestine, or if small, dry, light concretions float on the surface of the fluid evacuations, we must wash out the large intestine by **enemata.** Those enemata must be administered by means of a long tube, and the patient must be placed on his left side, or, better still, in the kneeling posture, with his head and shoulders depressed and the buttocks elevated; in this position the fluid will flow of its own weight into the large intestine, and remain long enough to soften old, hard, dry fæcal concretions which may be retained there. Each enema should be retained for 10 to 15 minutes. The enema may be best composed of warm soap and water (temperature about 100° F.), from a pint to a pint and a half or two pints, according to the capacity of the colon. Some recommend the introduction of much larger quantities of water into the colon for purposes of irrigation than those we have mentioned. Such very copious irrigations may be advisable in certain cases, but they must be used with great caution, and always by the medical attendant himself. The enema, which is simply for the purpose of washing out the colon and softening any hard concretions that may be in it, should be given daily until we are satisfied it has accomplished the purpose for which it was ordered. In very chronic and obstinate cases it will be advisable

to continue the daily use of an enema (in the same position of the body), which should now consist either simply of a pint of cold water, or a pint of cold water with a teaspoonful of common salt and half a teaspoonful of sodium bicarbonate dissolved in it. This daily use of such a cold enema for some months together, with a properly regulated diet and a daily dinner pill (preferably immediately before dinner), consisting of 1 or 2 grains of extract of aloes, half a grain of powdered ipecacuanha, half a grain of extract of nux vomica, and a grain of soap, we have seen completely restore the health of those who have ailed for years in consequence of chronic constipation.

In old, bedridden, and paralysed people it is not unusual to find in the rectum very large accumulations of hard fæces which no enema tube can penetrate; in such cases it is necessary, by means of the finger, or a spoon or scoop of some kind, to mechanically dislodge from the rectum as much of this accumulation as can be reached, and then to use softening enemata until the large intestine is thoroughly emptied, and to continue the daily use of an enema to prevent future accumulations. In cases like these, as it may be impossible to place the patient in the posture previously described, he may be turned over on his left side, or the buttocks may be raised by placing a hard hair-pillow under them; unless some contrivance of this kind is adopted, or a very long tube used, it will be found that the enema is often immediately rejected, and does not get beyond the rectum.

Enemata of olive oil and of ox gall have been recommended in cases of long-standing fæcal retention for their softening effect on the fæces. Large quantities of olive oil—8 to 16 ounces—have been introduced into the large intestine at one time, and retained there with excellent results. We have used smaller quantities than these—4 to 6 ounces—with great advantage in the constipation that often follows

typhoid fever. The temperature of the oil should be raised to about 100° F. If the patient is on his back the pelvis must be raised a little by placing a hard cushion under it, and the oil allowed to flow from an irrigator into the bowel *very slowly* through a long colon tube introduced for about 10 inches. From 15 to 20 minutes should be allowed for this process. The patient should, after the injection, remain in bed for an hour on his back, but turning, from time to time, on his right side and then on his left. The oil will often remain in the bowel for 3 or 4 hours, sometimes a whole night. If a motion does not follow after 4 hours it may be promoted by a small injection of water. This operation may be repeated daily until the motions become quite soft, regular, and natural.

The use of a small injection of *glycerine* for the relief of a loaded rectum has marked an advance in the treatment of some forms of constipation.

When the fæcal accumulation is in the rectum a patient can now make certain of an action of the bowels in a few minutes instead of having to wait the number of hours it may take for an aperient pill or draught to produce its effect. The glycerine seems to cause a free secretion of fluid from the rectal mucous membrane, and so promotes the discharge of indurated fæces.

It is, however, chiefly to the relief of an accumulation in the rectum that this applies. It is, therefore, valuable in cases where the rectum is subjected to mechanical pressure, as in pregnancy and other pelvic tumours, and also in those persons who experience a difficulty in defæcation owing to the dryness and hardness of the fæcal mass. It is, however, of only auxiliary service in the treatment of most cases of chronic constipation. A teaspoonful or two of glycerine may be injected by means of one of the small syringes supplied for this purpose, or suppositories containing glycerine may be employed;

these latter have been found convenient of application in children. In some instances we have found a tablespoonful of glycerine mixed with 2 or 3 ounces of water answer better than pure glycerine.

When the constipation is associated with what is called "**biliousness**," and the tongue is thickly coated, the complexion sallow, the conjunctivæ bile-tinted, and the stools pale and offensive as well as scanty, and the urine high-coloured, or when troublesome hæmorrhoids are present, it is necessary to promote the outflow of bile by the use of cholagogue remedies, and in the latter case by causing a free outflow of fluid from the intestinal vessels we relieve venous congestion and thereby remove hæmorrhoidal distension. We should in such cases prescribe a grain of calomel or 2 grains of blue-pill, or $\frac{1}{8}$th of a grain of resin of podophyllum, with 5 grains of compound rhubarb pill, or with 5 grains of colocynth and henbane pill, at bed-time, and a teaspoonful or two of Carlsbad salts in a tumblerful of hot water the following morning. Podophyllin proves a very irritating and unpleasant purge to some persons, but others are able to take regularly a teaspoonful of a tincture made by dissolving a grain of podophyllin in an ounce of compound tincture of cardamoms, without any unpleasant effects, and we have seen it prove very efficacious in the relief of hæmorrhoids, no doubt by the amount of fluid it causes to be discharged from the intestinal surface.

There are a number of medicinal expedients for relieving the milder forms of habitual constipation; few are better than the more or less regular use of a **dinner pill** such as the following:—

℞ Aloes extracti gr. jss.
Ipecacuanhæ pulveris } āā gr. ss.
Nucis vomicæ extracti }
Quininæ sulphatis gr. j.
Saponis gr. ss.

Misce, fiat pilula. To be taken immediately before dinner.

A tumblerful of cold water, or, if preferred, of an

effervescing slightly alkaline water, such as Apollinaris, may be at the same time taken night and morning.

Some patients prefer taking their aperient in the morning fasting in the shape of one of the **natural purgative waters,** such as Apenta, Friedrichshall, Püllna, Birmenstorf, or Rubinat; these contain the aperient and bitter magnesium sulphate, and hence, in Germany, they are called *bitter waters.* A few ounces, 3 to 6, of any of these waters taken fasting act rapidly with most persons and produce one or two loose motions. Carlsbad salts, composed chiefly of sodium sulphate, act more comfortably with some patients than the bitter waters. The dose is one to three teaspoonfuls dissolved in a tumblerful of hot water.

In place of these waters we can prescribe a morning draught, containing 1 dram or more of magnesium sulphate, 1 dram of sodium sulphate, 2 drams of syrup of ginger, and $1\frac{1}{2}$ oz. of cinnamon water. Sodium phosphate is preferred by many, as it is mild in its action, and almost tasteless.

In cases in which habitual constipation is associated with a tendency to corpulency and loaded abdominal veins, what the Germans call "abdominal plethora," excellent results are obtained from a course of waters at Carlsbad, Marienbad, Tarasp, Brides-les-Bains, or, at home, at Harrogate, Leamington, or Llandrindod.

In more purely dyspeptic cases, and where there is much want of tone in the whole alimentary canal, the gaseous sodium chloride waters of Kissingen and Homburg answer exceedingly well.

In such cases a course of ordinary hydrotherapy in a well-conducted hydropathic establishment is also often of great value.

Belladonna, ever since Trousseau warmly advocated its use in chronic constipation, has been largely employed in its treatment. It is believed by some to act by relieving intestinal spasm. It may be given

combined with nux vomica or associated with aloes, ipecacuanha, or other aperients. It is best at first to try its effect alone, or in combination with nux vomica; from $\frac{1}{6}$ to $\frac{1}{4}$ grain of extract of belladonna with $\frac{1}{4}$ grain or $\frac{1}{2}$ grain of extract of nux vomica may be given in a pill every night at bed-time. If this fails it may be combined with aloes, or ipecacuanha, or both.

The following formula has been found a good one:—

℞ Aloini gr. $\frac{1}{2}$.
Strychninæ sulphatis gr. $\frac{1}{16}$.
Extracti belladonnæ viridis gr. $\frac{1}{6}$.
Pulveris ipecacuanhæ gr. $\frac{1}{2}$.
Misce et fiat pilula. To be taken daily.

Employed alone, belladonna seems to be more efficacious in women than in men, and appears especially applicable to those cases of constipation where a painful condition of some of the pelvic viscera (uterus or ovaries) tends to constipation by inhibition of intestinal peristalsis. Opium in very small doses has been said to act as an aperient in similar cases.

It is only necessary to enumerate a number of other useful aperient medicines which have proved of value in the treatment of chronic constipation: compound liquorice powder; confection of senna; sulphur in the form of confection or lozenges, or tabloids; cascara sagrada, now very largely used in a variety of forms; euonymin; citrate of magnesia; all these are useful in appropriate cases, and enable us also to change the aperient from time to time, which will be found advisable.

Of all these perhaps *cascara* is at present the most popular, and it is presented to the public in every possible form—syrups, extracts, tinctures, capsules, lozenges, tabloids, etc. Its *prolonged* use, two months or more at a time, has been especially advocated for the relief of habitual constipation. It is, however, somewhat

difficult to estimate accurately the dose that is best suited to individual cases, and it is highly desirable to use the smallest dose that is consistent with efficacy; 20 or 30 minims of the fluid extract may be given at bed-time, and its effects noted, and the subsequent doses regulated accordingly. An *aromatic syrup* has been introduced into the B.P., and this may be given in doses of from a half to two teaspoonfuls. If taken in large purgative doses it is usually followed by constipation, and the point in its administration is to give just the quantity needful to procure one soft evacuation daily, and no more. Some find it best to give a small dose—5 to 10 minims of the fluid extract—three times a day, directly after meals, rather than a single dose at night; attempts should be made to diminish the dose, and finally, if possible, to do without the drug entirely.

We have found the sugar-coated tabloids of Burroughs and Wellcome a most convenient and efficacious form. These are made of three strengths, containing one, two, or three grains of the solid extract.

Cases of chronic constipation associated with general debility and anæmia, and dependent on want of muscular tone in the intestinal walls, require tonic as well as aperient treatment. In such cases nux vomica or strychnine with quinine and iron is especially useful. In the constipation of chlorosis the following prescription will be found valuable :—

℞ Ferri et quininæ citratis gr. lxxx.
Liquoris strychninæ ♏ xl.
Syrupi simplicis ʒj.
Aquæ ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls to be taken twice a day, an hour before food, and

℞ Aloes extracti gr. ij.
Belladonnæ extracti gr. ½.

Misce, fiat pilula. To be taken every night.

Or the following, which is very efficacious, but not so agreeable to take :—

℞ Ferri sulphatis gr. xvj.
Magnesii sulphatis ʒj.
Quiniæ sulphatis gr. xij.
Liquoris strychninæ ♏xl.
Acidi sulphurici diluti ♏l.
Aquæ ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls twice a day, an hour before breakfast and dinner.

This mixture will often succeed in overcoming constipation in anæmic women after most other aperients have failed, and it also acts as a blood tonic.

In certain cases in which it has appeared undesirable to give medicines by the stomach, hypodermic injections of a sterilised 2 per cent solution of *magnesium sulphate* have been employed successfully to overcome constipation. From 3 drams to an ounce of this solution is injected subcutaneously with the usual antiseptic precautions.

ADDITIONAL FORMULÆ.

Cascara mixture for habitual constipation.

℞ Extracti cascaræ sagradæ liquidi, ʒij.
Tincturæ nucis vomicæ, ʒvijss.
Tincturæ belladonnæ, ʒīvss.
Glycerini ad ʒiv.
M. f. mist. A teaspoonful night and morning for four days, then only at night.
(*Whitla.*)

Another.

℞ Extracti cascaræ liquidi, ʒv.
Tincturæ nucis vomicæ, ♏ lxxv.
Aquæ laurocerasi, ʒss.
Syrupi simplicis, ʒss.
Aquæ ad ʒv.
M. f. mist. Three or four teaspoonfuls in the day.
(*Dujardin-Beaumetz.*)

Aloes and iron pills for obstinate constipation.

℞ Extracti aloes aquosi, gr. j.
Ferri sulphatis, gr. ij.
M. et ft. pil. One to be taken three times a day after each meal for a week, then one twice a day for a fortnight, then one every night. (*Spender.*)

Dinner pills.

℞ Extracti aloes socotrinæ, gr. ss.
Extracti nucis vomicæ, gr. ss.
Pulveris ipecacuanhæ, gr. ss.
Pulveris capsici, gr. j.
M. f. pil. To be taken daily after dinner. (*Whitla.*)

For constipation in very young infants.

℞ Mannæ, ʒijss.
Aquæ callidæ, ʒjss.
M. f. mist. A dessertspoonful every hour until it acts. (*Monti.*)

For infants with rickets and intestinal atrophy.

℞ Olei morrhuæ, ʒijss.
Syrupi simplicis, ʒijss.
Mucilaginis acaciæ ad ʒiij.
M. f. mist. A dessertspoonful three times a day. (*Monti.*)

Dr. Baillie's dinner pills.

℞ Extracti aloes socotrinæ, gr. xv.
Pulveris ipecacuanhæ, gr. vi.
Pulveris zingiberis, gr. xxiv.
Syrupi, q.s.
M. et divide in pil. xii. A pill to be taken before dinner.

Dr. Gregory's pill for constipation.

℞ Extracti aloes aquosi, Saponis, Pulveris rhei, Pulveris ipecacuanhæ } āā gr. xij.
M. et divide in pil. xii. One or two for a dose.

Aperient lemonade.

℞ Acidi citrici, ʒv.
Magnesii carbonatis, ʒiij.
Syrupi simplicis, ʒij.
Tincturæ limonis, ♏xx.
Aquæ ad ʒx.
M. (*Mathieu.*)

Pills for constipation.

℞ Aloini, Extracti nucis vomicæ, Ferri sulphatis, Pulveris myrrhæ, Saponis } āā gr. ss.
M. f. pil.
If fæces are dry add—
Ipecacuanhæ pulveris, gr. ss.
If the pill gripes add—
Extracti belladonnæ, gr. ½.
One, or just as much of one as suffices to procure a natural action next morning, to be taken half an hour before the last meal of the day. As an alternative, 5 to 20 drops of fluid extract of *cascara sagrada* in an ounce of water may be taken at bed-time, or before dinner; or both failing to agree, 2 or 3 grains each of dried carbonate of soda and powdered rhubarb may be taken before the mid-day meal. (*Clark.*)

Podophyllin pills for chronic constipation.

℞ Podophylli resinæ, gr. j.
Extracti aloes aquosi, gr. x.
Extracti rhei, gr. x.
Extracti taraxaci, gr. xv.
M. et divide in pil. x. One, two, or three at bed-time. (*Nothnagel.*)

Iridin and aloes pills for constipation of the gouty.

℞ Iridin, gr. xxiv.
Aloes pulveris, gr. xviij.
Extracti hyoscyami, gr. iij.
M. et divide in pil. xij. One at bed-time, to be followed by a glass of Carlsbad water the following morning.

Pills for habitual constipation.

℞ Quininæ sulphatis, gr. xv.
Extracti aloes aquosi, gr. xxx.
Pulveris glycyrrhizæ, q.s.
Ut f. pil. lx. Take three pills night and morning.

Or

℞ Podophylli resinæ, gr. iv.
Extracti belladonnæ, gr. 1½.
Extracti gentianæ, q.s.
Pulveris menyanthis, q.s.
Ut f. pil. xxv. One to three pills in the morning.

Or

(in more obstinate cases)
℞ Pulveris rhei, Extracti aloes aquosi } āā ʒss.
Extracti colocynthidis, gr. iij.
Mellis, q.s.
Ut f. pil. xx. Two to four daily. (*Bamberger.*)

Cholagogue purgative pills.

℞ Hydrargyri subchloridi, gr. ½.
Podophylli resinæ, gr. ½.
Pulveris ipecacuanhæ, gr. ½.
Pilulæ colocynthidis et hyoscyami, gr. iij.
M. f. pil. at bed-time. (*Bruce.*)

Aperient and stomachic.

℞ Sodii bicarbonatis, gr. xv.
Spiritus ammoniæ aromatici, ♏ x.
Tincturæ sennæ compositæ, ♏ xv-xxx.
Infusi gentianæ compositi, ad ℥j.
M. f. haustus. To be taken three times a day five minutes before meals. (*Bruce.*)

Another.

℞ Pulveris rhei, gr. x.
Sodii bicarbonatis, gr. xv.
Tincturæ zingiberis, ♏ v.
Spiritus ammoniæ aromatici, ♏ xv.
Aquæ menthæ piperitæ, ad ℥i.
M. f. haustus. To be taken half an hour before food twice daily.

Another.

℞ Infusi rhei, ℥ss.
Tincturæ gentianæ compositæ, ℥ss.
Sodii bicarbonatis, gr. x.
Spiritus chloroformi, ♏ x.
Aquæ menthæ piperitæ, ad ℥j.
M. f. haustus. To be taken twice or thrice daily, half an hour before food.

CHAPTER X.

DISEASES OF THE INTESTINES—THE TREATMENT OF DIARRHŒA, INTESTINAL CATARRH, ACUTE AND CHRONIC.

DIARRHŒA a Disease as well as a Symptom—An Inflammatory and a Non-Inflammatory Form. *Causes* of Acute and Chronic Diarrhœa: Local Irritation from offending Ingesta—Influence of Cold—Secondary to Organic or Constitutional Disease—Endemic or Epidemic in Hot Weather, and probably Microbic and Specific—Sometimes Eliminative of Toxic Substances in the Blood—Infancy predisposes to Intestinal Catarrh—*Other Symptoms* of Acute Intestinal Catarrh. *Treatment:* Diet—Milk—Farinaceous Foods—Food for Chronic Cases—Raw and pounded Meat—Rest, general and local. *Medicinal Treatment*: Eliminative—Enemata—Castor Oil—Calomel—Use of Alkalies—Opium—Formulæ for Infants—Astringents—Salts of Bismuth—Chalk—Tannin—Intestinal Antiseptics—Sterilised Milk—Calomel—Salol—Resorcin, etc.—β-Naphthol—Lactic Acid—Beer-Yeast—*Chronic Diarrhœa*—Quinine in *Malarial* Cases—Milk and Vichy Water—Peptones—Mineral Astringents—Kissingen Water—Intestinal Irrigations. Additional Formulæ.

IT has been said that **diarrhœa** is a symptom and not a disease, and that the disease of which it is a symptom is *inflammation of the intestinal mucous membrane*, or *intestinal catarrh*. From the point of view of treatment this question is not, perhaps, of much importance, and we may regard diarrhœa both as a symptom and as a disease. Certainly there are forms of diarrhœa which are not inflammatory, and cannot be rightly considered as dependent on *inflammation* of the intestinal mucous membrane, and in which the symptom is of almost sole importance, and it may, therefore, be justly regarded as a functional disease.

In this chapter we shall regard *diarrhœa* as often dependent on acute and chronic intestinal catarrh, especially when the catarrhal condition is general, and affects a large extent of mucous membrane; but as occurring also in other states which are chiefly characterised by a morbid flux from the bowels.

We consider, then, that there is justification for the division of diarrhœa into inflammatory and non-inflammatory: the latter including those cases of emotional origin, or nervous diarrhœa, analogous to the polyuria of a hysterical attack, and those of mere exaggeration of physiological function, habitual in some persons, and in many instances dependent on any slight excess in the *quantity* of the ingesta. In these cases, too, the matters discharged are ordinary fæcal matters simply, in an unduly liquid state. In cases of diarrhœa dependent on inflammatory catarrh of the intestine the flux from the bowel consists in part of inflammatory exudation from the catarrhal mucous membrane, in part of intestinal secretions hurried onwards by the exaggerated peristalsis attendant on the inflammation, and in part of unabsorbed food, partially or wholly undigested. In chronic diarrhœa, due to chronic intestinal catarrh, abundant *muco-purulent* secretion may be present in the discharges.

With these few preliminary remarks we may pass on to the consideration of the **causes** of acute and chronic diarrhœa.

We must bear in mind that the intestinal mucous membrane is particularly liable to catarrhal inflammation, and that comparatively slight irritation is sufficient to excite it, especially in certain individuals in whom the intestinal mucous membrane is peculiarly sensitive.

1. The most common cause of intestinal hyperæmia, catarrh, and diarrhœa is **local irritation,** and the most usual local irritant is some offending ingesta. A variety of food substances will, under certain conditions, excite diarrhœa, either substances unsuitable in quality, *i.e.* in themselves indigestible, and acting as irritating foreign bodies, or substances in a state of commencing decomposition, and capable of acting as chemical irritants, or simply food too copious in quantity, or badly prepared. The pouring out of an excess of bile, or bile of an abnormal quality, may act in the

same way; on the other hand, an absence of bile, from inflammatory closure of the common duct, may also lead to diarrhœa, for in the absence of the alkaline bile, which usually neutralises the acidity of the chyme as it passes out of the stomach, the contents of the small intestine remain acid, and therefore act as an irritant, and set up an intestinal catarrh from the lack of bile. The loose motions are in such cases found to be white, or clay-coloured, and often very offensive, as a due admixture with bile also prevents the formation of irritating products of putrefaction by its known antiseptic action.

Long-retained indurated fæces (intestinal concretions) may set up catarrhal inflammation of the intestine, not only by *mechanical* irritation, but also by the toxic substances developed by the putrefactive changes they undergo.

2. **Chill** to the surface is a common cause of intestinal catarrh. The catarrh so caused is probably dependent on a reflex vaso-motor influence arising through the cutaneous nerves.

3. The intestinal catarrh may be **secondary,** and due to a morbid state of the intestinal mucous membrane, which may itself be caused by some other organic or constitutional disease—*e.g.* obstruction to the circulation through the liver or in the portal vein causing venous hyperæmia of the intestine, or a more general and more permanent venous congestion dependent on chronic pulmonary and cardiac disease. It will be readily understood how easily a diarrhœa may be excited in these morbid hyperæmic conditions of the intestinal mucous membrane by any slight irritation. Such hyperæmic states may, however, exist without diarrhœa. Lardaceous degeneration—tuberculous, cancerous, dysenteric, or typhoid ulceration of the mucous membrane, do not directly concern us now, as they will be dealt with in other chapters, but they also are well-known causes of diarrhœa.

4. Many instances of **endemic** or **epidemic** diarrhœa, such as are especially prone to occur in hot

weather, are doubtless infective and of **microbic** origin; and the elevation of temperature, which has been regarded as a cause of diarrhœa, may only act by calling the infective organisms into activity, or by promoting the activity of putrefactive processes in foods and beverages. Under this heading we should group those cases which occur after drinking water from suspected sources, and probably contaminated with sewage matters, and those associated with *malarial* infection.

5. Some attacks of diarrhœa are **eliminative**, and are excited by the presence of toxic substances in the blood, as in uræmia, etc.

6. Infancy seems to be a predisposing cause of intestinal catarrh, which is very common in nursing children. This is due not only to the extreme sensitiveness of their intestinal mucous membrane, but also to the frequent absence of that extreme care and cleanliness which are needed in the selection and preparation of their food in order to avoid exciting gastro-intestinal irritation. The too early recourse to farinaceous foods is especially responsible for much of the gastro-intestinal disorders of infancy.

Diarrhœa is often the only **symptom** of *acute* intestinal catarrh, but at other times attacks of pain and colic precede, and are relieved by, evacuations from the bowels. Some flatulent distension of the abdomen and tenderness on pressure are also common. Fever is present in some cases, especially in those caused by chill and those caused by the action of a specific contagion. Thirst is generally complained of in acute diarrhœa, owing to the considerable loss of water from the blood.

One of the chief points in the **treatment** of diarrhœa, whether **acute** or chronic, is a suitable regulation of the diet, and when the diarrhœa has been caused by faulty feeding, this, together with rest in bed, will often alone effect a cure. There is one general rule which applies to all cases of diarrhœa, and that is the avoidance of all foods which leave

much indigestible residue, and that may, therefore, tend to maintain irritation of the intestinal mucous membrane. Only such foods should be prescribed as leave an unirritating residue as a result of their digestion, and have no tendency to undergo decomposition into irritating acid substances in the intestine.

It is scarcely necessary to point out that all vegetables, fruits, nuts, brown bread, all fat, rich, or acid dishes, all forms of animal food that are hard or tough, and, therefore, difficult of digestion, should be avoided.

In cases in which milk is readily and easily digested it is one of the best foods. It should be first boiled, and given diluted with water, or lime water, or soda water. In cases in which milk is not easily digested, and when we find the curd of milk passed in the motions, we must prescribe unirritating farinaceous foods—arrowroot, sago, tapioca, or ground rice, prepared with water and flavoured with some aromatic spices, such as cloves, cinnamon, or nutmeg.

Egg albumen has been found an excellent food for children with diarrhœa when milk disagrees. The white of one or two eggs should be whipped up with half a pint of water, a little salt added, and a few drops of brandy. This may be given freely.

Many cases of acute diarrhœa may be quickly cured by limiting the food, for a day or two, to water-arrowroot, flavoured with a little port wine or cognac. Clear soup or *consommé*, when this is preferred (or as a variety), may be given, *thickened* with arrowroot, sago, or tapioca.

The best beverage is soda water and milk, with a small quantity of brandy, iced if there is much thirst and fever. Port wine and water may be given if preferred.

On the subsidence of the acute attack a gradual return to ordinary diet may be permitted. For a few days, however, we should restrict the patient to clear soup, or mutton or veal broth, thickened with a little

crumb of stale bread, tapioca, or sago. Boiled chicken, pheasant, or partridge, with rice, may be permitted, or some boiled or grilled whiting or sole and a little mashed potato. A little weak brandy and water or port wine and water may be allowed as a beverage.

The dietetic treatment of **chronic diarrhœa** is of no less importance, but it is difficult to carry out, owing to the impatience of most persons of the continued restraint which a suitable dietary implies.

The general principle to be borne in mind is that the food should be concentrated and small in bulk, easy of digestion in the stomach, and leaving but little residue to irritate the intestinal mucous membrane in its passage along it.

A strictly milk diet—unless in the exceptional cases in which milk does not agree—is the best. The milk should be boiled, and diluted with some alkaline water, such as Vichy or Apollinaris. Six ounces of milk with 2 ounces of Apollinaris water may be taken at first every three hours, and afterwards every two hours, if well borne. Peptonised milk or other predigested foods may be used in those cases in which ordinary milk is not well borne.

It must be remembered that an exclusive milk diet is rarely well borne, unless the patient is at the same time practically confined to bed. Indeed, rest in bed is an important condition in the treatment of all severe and troublesome forms of diarrhœa.

Some French physicians strongly advocate the use of raw meat in the treatment of chronic diarrhœa. This may be combined with the milk diet, if desired. An ounce of the lean of beef or mutton, thoroughly separated from all fat or fibrous tissue, is scraped or pounded to a pulp, and mixed with powdered sugar or currant jelly, or with a little thin tapioca or weak wine (port) and water, and taken twice or three times a day. Or, if this is objected to, some pounded underdone meat may be mixed with milk and water

or a little broth or clear soup. We should begin with quite small quantities, and these can be increased if the diet is well borne. If the diarrhœa ceases with this plan of feeding we should return gradually to the ordinary articles of diet, selecting, of course, those which are most easily digested, and taking care to avoid too copious a dietary.

In treating the chronic diarrhœa of infants and young children the greatest care must be given to their feeding. Minute investigation must be made into every detail as to the kind of food given, and its mode of preparation. It will constantly be found that some important physiological consideration has been overlooked or some error in the preparation of the food committed, or some form of food is being given persistently which causes irritation, and which requires to be suppressed or changed.*

If the *diarrhœa* has been caused by chill, rest in bed will be needed, and a warm poultice or hot flannel should be applied to the belly, and as a prophylactic an abdominal belt of flannel, or flannel underclothing, should be worn.

The **medicinal treatment** of diarrhœa must be adapted to the circumstance under which it has occurred. When it is clearly traceable to the presence in the alimentary canal of irritating ingesta or retained excrementitious substances, we should aid this effort of Nature to eliminate them. If from examination of the colon we have reason to think indurated fæces are retained there, or if small scybalæ are seen floating on the fluid stools, or if obstinate constipation has preceded the attack, copious enemata of warm soap and water, with or without a tablespoonful or two of castor oil, usually succeed in evacuating such accumulations as are in the large intestine. If, on the other hand, the irritating substances appear to be still in the small intestine, as is usually the case

* For further detailed considerations on infant feeding refer to the author's work on "Food in Health and Disease," part i., chapter xi.

when severe colicky pains are complained of, it is advisable to give a mild but efficient cathartic; a dose of 2 or 3 grains of calomel has the advantage of being tasteless and well borne even by an irritable stomach, and it is usually effectual; or a small dose of castor oil, and best in the form of an emulsion, may be given.

℞ Olei ricini ʒvj.
Pulveris tragacanthæ compositi ʒj.
Syrupi ʒiv.
Aquæ carui ad ʒiij.

Misce, fiat mistura. A tablespoonful every hour or two until relieved. A smaller dose must be given to very young children—one or two teaspoonfuls, according to age.

Gregory's powder (*pulvis rhei compositus*) is also an excellent medicine for children for these attacks, in doses of 5 to 20 grains. Rhubarb, it must be remembered, has the valuable property of acting as an astringent after its purgative effect has passed away. A dose or two of this kind, with proper attention to diet, will usually succeed in curing cases of acute diarrhœa, dependent on the presence of irritating substances in the intestine.

But many of the commonest forms of diarrhœa seem to depend on an unduly **acid** condition of the intestinal contents, possibly due to the absence of sufficient alkaline bile in the small intestine; at any rate, they are easily cured by alkaline medicines without the use of any direct astringents. In such cases you do not give medicine for the purpose of immediately arresting the flux from the bowels, but for the purpose of preventing its continuance. A few doses of the following mixture, limiting the food at the same time to water-arrowroot, with a little brandy, will quickly cure many of the slighter forms of acute diarrhœa:—

℞ Sodii bicarbonatis ʒj.
Spiritus ammoniæ aromatici ʒiij.
Tincturæ cardamomi compositæ ʒvj.
Aquæ cinnamomi ad ʒvj.

Misce, fiat mistura. Two tablespoonfuls to be taken every two or three hours until relieved.

There is a distinct advantage in curing a diarrhœa by such simple means rather than by the use of astringents and opiates, as the latter interfere with the action of the liver, and are apt in some persons to be followed by loss of appetite, constipation, headache, and other discomforts.

But many cases of acute diarrhœa cannot be arrested by such simple means, and we are obliged to have recourse to remedies which exercise a more direct influence over the catarrhal mucous membrane.

There are many such at our disposal, but there are none so immediately and strikingly successful as **opium.** This drug has a most remarkable influence over the circulation in mucous membranes in most persons. It has also the property of relieving pain and spasm, and when these accompany an acute attack of diarrhœa it will rarely be wise to withhold a dose or two of this drug.

A small pill of $\frac{1}{2}$ a grain of extract of opium may be given with each of the two or three first doses of the mixture we have just prescribed, when something more efficient is needed to relieve suffering and arrest the catarrhal flux. Young children do not tolerate opium well, except in very small doses, and yet they, perhaps, more than adults, need opium to allay the hyper-sensitiveness of the inflamed mucous membrane.

If there seems any good reason why opium should not be given internally, it may be applied in the form of the *linimentum opii*, externally, on hot flannels, or on cotton-wool, or sprinkled on a linseed-meal poultice. Such warm opiate applications are most useful in relieving pain.

There are several preparations in the *Pharmacopœia* which enable us to give opium in sufficiently small doses even to very young children. One of the best of these is the *pulvis kino compositus.* One grain of this powder contains only $\frac{1}{20}$th of a grain of opium, and this dose may be given to a child of the age of three months. Great care must, of course, be

observed in repeating the dose, and it should not be left to a nurse, but to a medical man, to determine this. The following is a useful formula :—

℞ Pulveris kino compositi gr. iv.
Pulveris cretæ aromatici gr. xvj.
Sodii bicarbonatis gr. viij.

Misce et divide in pulveres quatuor. A powder to be given in a teaspoonful of water-arrowroot every three or four hours until relieved. In very young infants, under three months, a half of one of these powders, equal to one-fortieth of a grain of opium, may be given.

A safe and useful plan of giving small doses of opium in order to arrest infantile diarrhœa and to relieve the pain and restlessness attending it, is by means of small enemata. A tablespoonful of the following mixture should be shaken up with an ounce of thin warm starch and injected into the bowel :—

℞ Pulveris ipecacuanhæ compositi gr. iv.
(Dover's powder)
Acidi tannici gr. xij.
Mucilaginis acaciæ ʒij.

Misce, fiat enema. A tablespoonful for each injection.

As there is $\frac{1}{10}$th of a grain of opium in each grain of Dover's powder, and as given in this way the opium is very slowly and gradually absorbed, it forms a perfectly safe method of administering opium to young children ; but unless the diarrhœa is at once arrested much of the enema will be discharged with the next loose motion, and it may, therefore, require to be soon repeated. A larger dose—2 to 3 grains of Dover's powder—may be given to older children (five years and upwards) in this way.

Some writers object to giving opium to young children, in any dose, for this purpose ; but physicians of ripe experience who have seen the wonderfully calming and curative effect of quite minute doses of opium in such cases will not hesitate to avail themselves of this valuable resource. If a medical man has not learnt *how* to use opium safely under such

circumstances, he can hardly be said to *know* his profession. In the acute choleraic diarrhœa of children, Osler recommends morphine hypodermically. He says, "This drug alone commands the situation. A child of one year may be given $\frac{1}{100}$th to $\frac{1}{60}$th of a grain, to be repeated in an hour, and again if not better."*

In adults, if there is much gastric irritability as well as intestinal pain and spasm, relief may be almost immediately obtained by a hypodermic injection of $\frac{1}{6}$th to $\frac{1}{4}$th of a grain of the sulphate or hydrochlorate of morphine.

In severe, protracted, or recurrent forms of acute diarrhœa, as well as in the chronic cases, it may be needful to have recourse to the **direct astringents**, of which there are many, or to one or other of these in combination with opium.

The preparations of **bismuth** enjoy, and justly, a great reputation in the treatment of intestinal catarrh; the oxy-carbonate, the oxy-nitrate, and the oxy-chloride (preferred by many) are all efficacious, and the salicylate is also largely used on account of its antiseptic properties; but it is probable that all these preparations of bismuth act to some extent as antiseptics. The *salicylate* should be chosen in the case of infectious or putrid diarrhœa, or when the evacuations are very offensive.

These preparations of bismuth are tasteless, and can, therefore, be easily given to children. They probably act to some extent locally, by affording a protective covering to the inflamed mucous membrane. They further absorb sulphuretted hydrogen, which may be a part of their curative action, and are eliminated in the form of *black* sulphides. The oxy-nitrate not only acts as an inert powder and as an absorbent of gases, but it has also marked antacid properties. It is a very basic salt, and is thus enabled to neutralise the excessive acidity of the intestinal contents. It is often advantageous to mix bismuth with prepared chalk, which also has both antacid and

* "Principles and Practice of Medicine" (fourth edition), p. 518.

absorbent properties. The following formula for bismuth and chalk in powders is suitable for children :—

℞ Bismuthi subnitratis ʒss.
Cretæ preparatæ gr. xviij.
Sodii bicarbonatis gr. xij.
Pulveris tragacanthæ compositi gr. xx.

Misce et divide in pulveres sex. A powder in a dessertspoonful of thin arrowroot every three or four hours. Half this dose may be given to infants and very young children, and twice the dose to elder ones.

For adults the following mixture may be prescribed :—

℞ Bismuthi carbonatis gr. lxxx.
Pulveris cretæ aromatici gr. clx.
Sodii bicarbonatis gr. xl.
Spiritus ammoniæ aromatici ʒiv.
Mucilaginis tragacanthæ } āā ʒij.
Aquæ chloroformi }
Aquæ cinnamomi ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls every two or three hours.

In many cases larger doses of bismuth than this should be given. It is now frequently given in doses of 20 to 60 grains three times a day.

The addition to this mixture of 20 minims of liquor opii sedativus makes a valuable combination for the relief of intestinal pain and irritation as well as of diarrhœa.

Tannin and the various vegetable astringents containing it, such as catechu, rhatany, kino, hæmatoxylum, are valuable remedies in the treatment of acute and chronic diarrhœa. They are usually used in combination with antacids, bismuth, opium, etc.

Tannin is most useful for administration in enemata, and, as we have already said, a small enema of 1 to 3 ounces of warm thin starch containing 5 to 20 grains of tannin and 1 to 10 grains of Dover's powder, according to the age of the patient, is very efficacious in arresting severe forms of acute diarrhœa.

The *compound powder of catechu* of the B.P. is a useful form, its value depending not only on the

tannin contained in the catechu, but also on the carminative substances combined with it. The dose is 10 to 40 grains.

Some new preparations derived from tannin have been recently introduced for the treatment of diarrhœa by manufacturing chemists. The advantage claimed for them is that they pass through the stomach unchanged and exert a local action on the intestine. *Tannalbin*, a compound of tannin and albumen, is a tasteless insoluble powder given to adults in doses of 8 to 15 grains. *Tannoform* is also a powder insoluble in water, and is a compound of tannin and formic aldehyde. It has been used as an intestinal antiseptic and astringent. *Tannigen* is, perhaps, the most popular of these novelties. It is a compound of acetic acid and tannin. It is a tasteless insoluble powder, only dissolved (and tannin reformed) in the alkaline intestinal secretions. The dose is 2 to 5 grains for a child, 5 to 15 grains for an adult, three or four times a day.

A useful prescription for an attack of diarrhœa which is tending to become chronic, and which appears to be maintained by a certain amount of loss of tone in the intestinal mucous membrane, is the following:—

℞ Tincturæ catechu ℥ij.
Sodii bicarbonatis gr. lxxx.
Spiritus ammoniæ aromatici ʒiv.
Tincturæ nucis vomicæ ♏cc.
Infusi calumbæ ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls three times a day an hour before taking food.

In other cases a better effect will be obtained by giving doses of 10 or 15 minims of *aromatic sulphuric acid* in the above mixture in the place of the soda and ammonia.

We have found some troublesome forms of diarrhœa (especially those of phthisis and also some neurotic forms) more amenable to the *tincture of coto bark* or its alkaloid *cotoin* than to any other

remedy. If the tincture is used it requires to be *mixed carefully*, or much of its resinous principle will be deposited and lost. A dram of the tincture should be mixed with 2 drams of spirit of chloroform and 4 drams of tincture of cinnamon, and this rubbed down with an ounce of mucilage, and then diluted with 4 ounces of carraway water. A tablespoonful of this mixture may be given to an adult every three or four hours, and one or two teaspoonfuls to a child.

Attention has for some time been directed to the use and efficiency of certain **intestinal antiseptics** in the treatment of some forms of acute diarrhœa (enteritis and entero-colitis) of supposed microbic origin, especially in young children.*

The interesting researches of Escherich, Vignal, Hayem, Brieger, A. Gautier and others have thrown much light on the action of the numerous forms of micro-organisms found in the alimentary canal. There are no microbes to be found in the intestinal canal of the new-born infant, but they begin to appear there soon after birth, entering, no doubt, by the mouth from the surrounding air. If the child is fed by other than its mother's milk (unless the milk used is sterilised) microbes may also enter the alimentary canal in its food. At any rate, an immense number of micro-organisms are found in the alimentary canal of an infant a few days old. Some of these microbes may actually take part in the physiological processes of assimilation; others may, under normal conditions, be quite inoffensive and indifferent; the substances they contribute to form, although toxic in large quantity, are in the minute quantities produced readily eliminated, and prove harmless. Amongst these are various organic acids, sulphuretted and carburetted hydrogen, ammonia, leucine, tyrosine, indol,

* This specific epidemic form of diarrhœa, which has been variously designated Choleraic diarrhœa, Cholera nostrus, infantile cholera, gastro-enteritis, etc. etc., has now been officially named by the College of Physicians "Epidemic Enteritis, or Zymotic Enteritis."

scutol, and above all, certain poisonous alkaloids known as **ptomaines.** But if from the prevalence of certain conditions, such as the occurrence of great heat and moisture, or the production of some abnormal change in the chemical reactions of digestion, the contents of the stomach and intestines become transformed into a medium particularly favourable to the culture and multiplication of these microbes, if they encounter putrescent substances in abundance, the toxic substances already mentioned are developed in such increased quantities that they cannot be eliminated with sufficient rapidity by the excretory organs, and toxic symptoms make their appearance, *diarrhœa* being the most frequent of these. This symptom seems to be excited especially by the *organic acids* and the *alkaloids* formed by microbic action. The simplest and commonest forms of diarrhœa are probably provoked by the irritant action of these *acids* on the intestinal mucous membrane, and the graver forms, notable for the suddenness, violence, and seriousness of the attack, are probably due to the poisonous effects of animal alkaloids.

It is clear from these considerations that the rational treatment of such forms of diarrhœa must involve the adoption of means (both alimentary and medicinal) to promote intestinal antisepsis. All food must be rejected that may add to the number of microbes in the intestinal canal or favour their multiplication. There are no microbes in milk sucked from the nurse's breast, so that the transferring of a hand-fed infant to a wet nurse is an antiseptic measure. Sterilising the milk used for feeding an infant is another antiseptic proceeding.*

One of the simplest medicinal measures for the promotion of intestinal antisepsis is a *purge*, which carries away the undigested and fermenting products of a faulty alimentation, as well as the microbes with

* Methods of sterilising milk will be found described in the author's work on "Food in Health and Disease" (new edition), p. 557.

which they swarm. In **calomel** we have a medicine which is both purgative and antiseptic, and hence its great value and success in the treatment of infantile diarrhœa of a choleriform type when administered at the onset of the attack. The dose to be given must depend on the age of the child, but small doses frequently repeated are the best; $\frac{1}{4}$ grain every hour for five or six doses, mixed with $\frac{1}{2}$ grain of sugar of milk, and thrown on the child's tongue, is a good way of giving it. Some physicians give from 1 to 4 grains at a dose, and some prefer *grey powder*, as its action is milder.

Salol has been warmly advocated as an intestinal antiseptic in these cases, and especially by Dr. Moncorvo, of Rio, in the treatment of the acute diarrhœa or enteritis of children, of malarial origin. Soon after commencing its use the diarrhœa lessens and disappears, the stools lose their fœtid odour, and the vomiting and the flatulent colicky pains cease. He considers it perfectly innocuous even to the youngest infants.

The doses he has employed have varied, according to the age of the child and the severity of the attack, from 2 to 30 grains in the twenty-four hours. It has been estimated that a child of six months should take $\frac{1}{2}$ grain every two hours; one of two years, 2 grains; and one of five years, 3 grains. It may be best given to children suspended in a mixture with a little mucilage and syrup.

The following formula is suitable for adults and in chronic cases:—

℞ Salol
Bismuthi salicylatis } āā ʒijss.
Sodii bicarbonatis

Misce et divide in pulveres triginta.

One to be taken before food twice or three times a day. Many other substances have been suggested as intestinal antiseptics and for the treatment of these forms of diarrhœa.

An emulsion of *petroleum* (33 per cent.) has been found efficacious. It is doubtless very soothing to the intestinal mucous membrane.

Resorcin has had many advocates. It may be given in doses of 1½ to 5 grains in a mixture, or in form of powder, according to the following formulæ:—

℞ Resorcini gr. xij.
Glycerini ʒiv.
Tincturæ opii ♏x.
Aquæ cinnamomi ad ʒiv.

Misce, fiat mistura. Dose, one tablespoonful for an adult, one or two teaspoonfuls for a child.

Or:—

℞ Resorcini gr. xij.
Bismuthi carbonatis ʒss.
Pulveris ipecacuanhæ compositi gr. vj.
(Dover's powder)

Misce et divide in pulveres sex. A powder every four hours. For children over five years of age.

Creasote, carbolic acid, creoline, naphthaline, menthol, thymol, sodium salicylate and benzoate, nitrate of silver, hydrochloric acid and pepsine, tincture of iodine, have all had their advocates for this purpose.

β-Naphthol and hydronaphthol, in doses of 1 to 2 grains every two to six hours, have been found very useful as intestinal antiseptics in various forms of diarrhœa: the green diarrhœa of infants, the diarrhœa of typhoid and tubercular disease, and the common forms in adults.

Ichthalbin, a combination of *ichthyol* and *albumin*, has been given by Rolly, of Heidelberg, with much benefit, in the chronic enteritis, with diarrhœa, of children. It acts as an intestinal antiseptic. He gave from 8 grains up to 45 grains three times a day.

Copious enemata of warm water mixed with 10 per cent. of alcohol or ½ per cent. of salicylic acid or creolin water (¼ to ½ per cent.) are of use when we wish to exercise an antiseptic action on the large intestine.

The researches of Professor Hayem into the nature of the so-called "green diarrhœa" of infants has led to the introduction of **lactic acid** as a remedy for this and other forms of diarrhœa. The presence of a special bacillus in these cases has been demonstrated by him, and when isolated and cultivated it has been found to produce the green matter by a sort of process of excretion. Hayem observed that the vomited matters and the stools in these cases were either neutral or alkaline, and this led him to the discovery that this bacillus could not live in an acid medium. Hydrochloric acid he found a good remedy, but its action was uncertain, and he was led to try the effect of lactic acid. He gave a teaspoonful of a 2 per cent. solution to the infant a quarter of an hour after each suckling—from 5 to 8 teaspoonfuls in twenty-four hours. The vomiting, if present, soon ceased, the motions lost their *green* colour and became yellowish, and in a short time became normal in appearance and frequency. It was necessary to disinfect the vomited substances, the motions, and the soiled linen by treating them with a solution of corrosive sublimate.

M. Hayem considers this form of diarrhœa is spread by contagion, and that the agents of infection are the germs deposited on the linen soiled by the motions. Although lactic acid given by the mouth is largely absorbed in the stomach in the form of lactates, yet given in sufficiently large doses it can, in part, be found in the diarrhœic evacuations, and it can, therefore, exert its topical and germicide action in the intestine.

Intestinal irrigation (enteroclysis) has also been advocated in the epidemic summer diarrhœa of children as a valuable adjunct to other treatment. Cold or ice water is used when the temperature is high with the object of reducing it. This method tends to cleanse the bowels of offensive accumulations and to diminish or counteract or dissipate the dangerous effects of the poisonous animal alkaloids which may have been developed. Its systematic

employment has been said to ameliorate the symptoms and to shorten the course of the disease.

Another remedy which has been highly recommended lately in the treatment of the gastro-enteritis of infants and in analogous affections in the adult is *beer yeast.* Its mode of action has not as yet been explained. It has been suggested that it may carry on its own cell-growth at the expense of other germs, or that it may act simply by secreting a bactericidal substance. It is best given in the dry form as prepared in Hayem's laboratory in Paris. In infants it is usually given in the form of enemata; after washing out the bowel with warm water an enema compound of a teaspoonful of yeast dissolved in 2 ounces of tepid water that has been boiled is given in the ordinary way by a ball syringe. The child's nates must be held together for a few minutes to prevent its rejection. This may be repeated twice or thrice daily. If the diarrhœa still continues, the same dose of yeast should be given by the mouth, dissolved in boiled water.

It has been found to act better when given by the mouth than when administered *per rectum*, and adults can take 2 or 3 tablespoonfuls daily dissolved in boiled water—a tablespoonful to 3 ounces of water.

The **chronic** forms of diarrhœa are generally those which have resisted the treatment usually applied during the acute stage, or those which are acquired in tropical countries, or those which depend on some constitutional tendency to chronic intestinal flux, or to excessive peristalsis unduly hurrying the food through the intestinal canal.

These cases are often difficult of cure, and tax all our therapeutic resources. We have already pointed out the necessity for a searching examination into the food habits of such patients, and the necessary dietetic prescriptions to be enforced. It is also, of course, extremely important to ascertain that the diarrhœa is not dependent on the existence of organic disease.

Cases of malarial origin have been rapidly cured by the administration of quinine; it is necessary, therefore, not to overlook such a possible origin of the disease.

In some forms of chronic diarrhœa in *hysterical* women a prolonged *rest-cure* is the best remedy, associated with change of air and scene. If it should be due to increased and abnormal peristalsis, the bromides may prove useful.

The cases of chronic diarrhœa which originate amongst Europeans in tropical countries are best treated by dietetic measures. Dujardin-Beaumetz maintained that the only efficacious treatment consisted in restricting the patient to a diet of milk mixed with Vichy water. Dr. Feris (quoted by Dujardin-Beaumetz) found it better to treat them with *solid peptones*, from 3 to 6 tablespoonfuls a day, allowing at the same time 2 pints of milk daily.

In chronic diarrhœa, *bismuth* and the vegetable astringents already mentioned, with or without opium, will usually have been tried, and have failed to do more than procure temporary relief. In such cases, if massive doses of bismuth have failed, we sometimes find that the stronger mineral astringents will succeed better, such as oxide of zinc, acetate of lead, sulphate of copper, nitrate of silver, or pernitrate of iron, perchloride of iron, etc.

The *oxide of zinc* may be given in 5 to 10 grain doses in pills combined with a little chalk and opium, as follows:—

℞ Zinci oxidi gr. vij.
Cretæ preparatæ... *gr. ij.
Extracti opii gr. ¼
Mucilaginis quantum sufficiat
ut fiat pilulas duo. To be taken three or four times a day.

The *acetate of lead* is a very effectual astringent in chronic diarrhœa, but being itself a poison it is not usually resorted to until more simple remedies have failed; it is not a remedy that should be given

* This is added to avoid the possibility of some chloride of zinc being formed by the acid of the gastric juice.

for long periods at a time. It is best given in the form of a pill combined with opium:—

℞ Plumbi acetatis gr. ij.
Extracti opii gr. ss.
Misce, fiat pilula. To be taken three times a day.

Sulphate of copper is a still more effectual remedy for chronic diarrhœa; like the preceding, it is usual to combine it with opium. *Small* doses only must be given at first, on account of its irritating effect on the stomach.

℞ Cupri sulphatis gr. ij.
Pulveris cinnamomi gr. xij.
Pulveris opii gr. ijss.
Mucilaginis quantum sufficiat
ut fiat pilulas duodecim. One pill, which may be increased to two, to be taken three times a day.

Nitrate of silver also may be given, in troublesome cases, in doses of ¼ or ⅓rd of a grain in a pill, with the same quantity of extract of opium. These astringent pills should be coated with keratine and given when the stomach is empty; they may then pass into the intestine, and exercise a favourable influence on ulcerative processes there which may possibly be keeping up the irritation and preventing a cure.

The *pernitrate of iron* has been found useful in forms of chronic diarrhœa associated with defective tone and general anæmia. The following mixture may be prescribed:—

℞ Liquoris ferri pernitratis ♏xx
Liquoris strychninæ ♏iii.
Aquæ chloroformi.... ʒij.
Infusi calumbæ ad ℥j.
Misce, fiat haustus. To be taken three times a day.

Small doses of Kissingen water have been found useful in the treatment of some forms of chronic diarrhœic intestinal catarrh. In small quantities, according to Leube,* it has a constipating rather than an aperient effect, and as it promotes gastric digestion,

* Ziemssen's "Practical Medicine," vol. vii., p. 390.

the chyme entering the intestine is in a condition more favourable for absorption.

Rectal or intestinal irrigations with cold water have been found to have a soothing and astringent effect in some forms of chronic diarrhœa, both in children and in adults. By means of a long tube, and by placing the patient in a suitable position, the water should be made to pass as high up as possible. Some astringent salt may be added to the water, such as alum, sulphate of zinc, or acetate of lead, in the proportion of 4 or 5 grains to the pint.

We must not omit to mention the excellent results that are often obtained in cases of chronic diarrhœa (catarrhal enteritis), especially in the gouty and rheumatic, from a course of treatment at *Plombières*, where the *ascending douche* is extensively applied. Very great benefit has been derived from treatment at that spa, even in most inveterate and troublesome cases.

Many other drugs have been used by various physicians with advantage in the treatment of chronic diarrhœa; examples of most of these will be found in the following formulæ.

ADDITIONAL FORMULÆ.

For acute diarrhœa of infants, and to check putrefactive changes in intestine.

℞ Hydrargyri biniodidi, gr. $\frac{1}{10}$.
Dissolve in sufficient iodide of potassium, and add chloral hydrate, 1 grain. (This dose may be given in a teaspoonful or two of dill-water.) (*Luff.*)

Creoline in the treatment of acute gastro-enteritis of infants.

℞ Creolini, guttæ iij.
Syrupi althææ, ʒv.
Aquæ canellæ ad ʒiij.
M. f. mist. A teaspoonful every hour for very young infants.

Powder for infantile diarrhœa.

℞ Sodii bicarbonatis, gr. iv.
Pulveris rhei, gr. jss.
Pulveris cinnamomi, gr.
M. f. pulv. To be taken twice a day. (*Whitla.*)

For diarrhœa in infants with milk curds in stools.

℞ Pulveris guaranæ, gr. xv.
Pulveris ipecacuanhæ compositi, gr. $\frac{3}{4}$.
Pulveris sacchari albi, gr. xlv.
M. et divide in pulv. x. A powder every two or three hours. (*Monti.*)
(The dose may be doubled for older children.)

For profuse diarrhœa in infants without dyspepsia.

℞ Tincturæ krameriæ, ʒss.
Tincturæ opii, ♏j.
Syrupi simplicis, ʒijss.
Aquæ destillatæ, ʒiij.
M. f. mist. A dessertspoonful every two hours. (*Monti.*)

Powders for chronic diarrhœa in infants with anæmia.

℞ Ferri carbonatis, gr. jss.
Pulveris ipecacuanhæ compositi, gr. jss.
Pulveris sacchari, gr. xlv.
M. et divide in pulv. x. Three or four powders daily. (*Monti.*)

Salicylate of iron in the fœtid diarrhœa of infants.

Ferri sulphatis, gr. xx.
Sodii salicylatis, gr. xx.
Glycerini, ʒiij.
Aquæ, ʒiij.
Dissolve the sulphate of iron and the salicylate of soda separately, and then mix. A tablespoonful every hour until the stools become blackened. (*Braithwaite.*)

A drink in infantile diarrhœa.

℞ Acid. lactic, 45 grains.
Aquæ flor-aurantii, ʒj.
Aquæ, ad ʒviii.
M. A tablespoonful every two hours.

For summer diarrhœa.

℞ Extracti hæmatoxyli liquidi, ʒij.
Acidi sulphurici aromatici, ♏lxxx.
Spiritus chloroformi, ʒvj.
Tincturæ opii camphoræ } ää ʒss.
Tincturæ cardamomi compositæ } ää ʒiss.
M. A teaspoonful, in water, after each action of the bowels. (*Eshner.*)

Arsenite of copper in chronic diarrhœa.

℞ Cupri arsenitis, gr. $\frac{1}{10}$.
Aquæ, ʒv. ad ʒxv.
M. A teaspoonful every fifteen to forty-five minutes until the diarrhœa ceases. (*Bentley.*)

Nitrate of silver injection in ulcerative colitis.

℞ Argenti nitratis, ʒss ad ʒj.
Aquæ destillatæ, O j ad O ij.
Elevate the hips, and let the injection flow in slowly from a syphon-bag. (*Osler.*)

Pills for chronic diarrhœa.

℞ Extracti krameriæ
Extracti monesiæ
Pulveris calumbæ } ää ʒss.
Pulveris ipecacuanhæ compositi
Olei anisi, guttæ ij.
M. et divide in pil. xl. Six to ten to be taken daily. (*Huchard.*)

Mixture for chronic diarrhœa.

℞ Tincturæ catechu, ʒj.
Tincturæ kino, ʒiv.
Tincturæ opii, ♏lxxxvj.
Spiritus camphoræ, ʒjss.
Misturæ cretæ ad ʒiij.
M. f mist. Two teaspoonfuls every four hours. (*Whitla.*)

For chronic diarrhœa with flatulence.

℞ Tincturæ opii, ♏lx.
Extracti hæmatoxyli, gr. lxxv.
Syrupi corticis aurantii, ʒijss.
Aquæ menthæ piperitæ ad ʒv.
M. f. mist. A tablespoonful every two hours. (*Bamberger.*)

Pills for atonic diarrhœa.

℞ Acidi tannici, ʒss.
Extracti opii, gr. $\frac{3}{4}$.
Extracti calumbæ, ʒss.
M. et divide pil. xx. One every three hours. (*Bamberger.*)

Powders for the same.

℞ Zinci sulphatis, gr. xv.
Opii pulveris, gr. ijss.
Sacchari albi, ʒijss.

M. et divide in pulv. xx. A powder three times a day.
(*Bamberger.*)

Antiseptic powders.

℞ Benzo-naphthol, gr. ij.
Bismuthi salicylatis, gr. v.
Resorcin, gr. ij.

M. et f. pulv. One every three hours.
(*Prof. W. W. Johnston.*)

CHAPTER XI.

DISEASES OF THE INTESTINES—THE TREATMENT OF PERITYPHLITIS OR APPENDICITIS AND OF DYSENTERY.

The Meaning and Nature of Perityphlitis. APPENDICITIS, its Nature and Causes—Symptoms of Appendicitis—Treatment of Acute Cases—Symptoms and Treatment of more Chronic Forms—Of *Relapsing* and of *Suppurative* Forms—Fæcal Impaction Cases—Symptoms—Indication for Treatment—Caution in Use of Opium—Local Measures—Evacuants—Enemata—Salines—Calomel—Sodium Sulphate—Intestinal Antiseptics—Salol—The Question of Operation—Prophylaxis. DYSENTERY—Etiology—A Specific Germ—Symptoms—Varieties—Indications for Treatment—Opium to relieve Pain—Appropriate Food—Intestinal Antisepsis—Aperients—Ipecacuanha—Aperient Sulphates—Antiseptic Irrigation—Astringents—Quinine and Arsenic in Malarial Cases—Supporting Food and Tonics—Change of Climate—*Prophylaxis*. Additional Formulæ.

THOSE local morbid conditions occurring in the right iliac region, in the neighbourhood of the cæcum, and formerly described under the designation typhlitis and perityphlitis, are now more commonly spoken of as cases of appendicitis, since it has been shown that the appendix vermiformis plays a predominant part in the origin of this affection. Treves, however, prefers the term "perityphlitis," and speaks of "appendicitis" as an "uncouth name."* "Perityphlitis," he observes, "indicates with sufficient clearness the predominant pathological feature of an affection which may arise in *more ways than one*, and which has no precise clinical individuality until the peritoneum in the cæcal region has become inflamed." Treves is commendably undogmatic in treating of this disease, and avoids and condemns the almost reckless statements made by certain other writers on this somewhat hotly-debated subject. Treves, while admitting that

* Allbutt's "System of Medicine," vol. iii., art. Perityphlitis.

in the vast majority of cases the trouble begins in the appendix, recognises a fact which others have ventured to deny, viz. that the disease sometimes takes its origin in the cæcum, although such a mode of origin is uncommon.

In discussing this point Osler argues that "the cæcum is rarely, *if ever*, filled with hardened fæces."* As we doubt this, and as it has a bearing on the appropriate treatment of such cases, we venture again to quote Treves' observations, with which, in the main, we are in agreement.

"The commonest cause," he says, "of such cases of perityphlitis as arise in the cæcum is the *stercoral ulcer*, due to the mechanical pressure and the chemical irritation of fæcal masses which have long been lodged in the cæcum. . . . In cases of considerable fæcal impaction the *greatest strain falls upon the cæcum*, and in absolute obstruction of the colon low down, the bowel, if it gives way, *will give way in the cæcal region*. . . . Inasmuch as fæcal impaction is *most common* in the cæcum, it is no matter of wonder that the stercoral ulcer should be most common in that part of the colon. If the ulcer acquires a sufficient depth to allow the peritoneum to be infected, perityphlitis results." Treves claims, as we do, "a definite position for the stercoral ulcer in the production of perityphlitis." The remarkable thing is that it should ever have been disputed!

Perityphlitis, then, is a term with a somewhat larger meaning than the name *appendicitis*, as it includes cases in which the appendix may be free from disease.

By **appendicitis** we mean inflammation of the *vermiform appendix*, usually determined by the presence of some fæcal concretion, or foreign body, within it, which may lead by ulceration to perforation, and to the extension of the inflammation to the tissues surrounding the appendix.

In case of perforation a local suppurative peri-

* "Principles and Practice of Medicine" (fourth edition), p. 530.

tonitis may be excited, limited by adhesions, and ending in the formation of an abscess which may point towards the surface. Or if perforation occur before adhesions have taken place, very serious general septic peritonitis will be aroused. Or the appendicitis may take a more chronic form, and appear as a series of relapsing attacks, and this tendency has led some to liken the appendix to an abdominal tonsil, prone, like the tonsil in some persons, to recurrent attacks of inflammation, which occasionally run on to suppuration.

Or suppurative peritonitis may arise from the passage of infective micro-organisms through the walls of the appendix into the peritoneum. Broca* maintains that in many instances the inflammation of the appendix is only a part of a general entero-colitis, which recovers and passes away in other parts of the intestine, but lingers and recurs, from structural reasons, in the appendix.

It is evident, from its anatomical situation, that the local inflammation attending an attack of appendicitis may extend to the cæcum and to the tissues around, and it has been asserted that 90 per cent. of the cases of perityphlitis are the result of disease of the vermiform appendix.

As to the *causes* of this affection, the tendency to it would seem to "run in families."† It is most commonly observed in young adults, but is found to occur also in young children and in old people. It is far more common in males than in females. It is more common in summer than in winter, and it is frequently referrible to injury, as blows, strains, and violent exertion. It is a question worthy of consideration whether the modern devotion to cycling has not had some relation to the remarkable increase of late years in cases of appendicitis, with which it has coincided.‡ The commonest exciting cause,

* "L'Appendicité." Paris: J. B. Baillière et fils, 1900.

† Treves, *op. cit.*

‡ Broca thinks the influenza epidemic has had to do with this ("L'Appendicité,' Paris, 1900).

according to Treves, is the lodgment of undigested matters or of fæcal masses in the colon, and hence its frequency in chronic dyspeptics and persons who eat hastily and do not properly masticate their food. He would give prominence, as Broca does, to colitis from irritating ingesta as a cause of peri-typhlitis. The entrance of foreign bodies into the appendix is not nearly so frequent a cause as was at one time supposed. Gout or rheumatism has seemed to have a causal relation to some cases in which, possibly, the appendix was not itself involved, and in which the symptoms have quickly disappeared on the administration of sodium salicylate.*

The **symptoms** of **appendicitis** and the treatment indicated will differ according to the acuteness and form of the attack. In the *most acute* form, when perforation occurs suddenly, the patient is seized with a sudden, severe pain in the iliac region, and this is rapidly succeeded by the signs of acute peritonitis, with a tendency to early collapse and death. The abdomen becomes distended and exquisitely tender, the legs are drawn up, the respirations are hurried and wholly thoracic, there are usually vomiting and the other symptoms of acute suppurative peritonitis. In such a case there has been a sudden rupture of an ulcerated portion of the appendix before adhesions could take place, and an escape of fæcal matter into the peritoneum, setting up a diffused suppurative peritonitis.

Some maintain that the passage of micro-organisms through the walls of the appendix without perforation is sufficient to set up such an attack.

The **treatment** appropriate to such a case is the administration of opium to relieve pain, as in acute peritonitis; immediate abdominal section, before collapse sets in, followed by drainage of the abdominal cavity. Success can only be hoped for when operation is resorted to very early, as there is marked tendency to rapid collapse, and then operative interference would be useless.

* *See* case by the Author, *Brit. Med. Journal*, vol. i., 1894.

If operation is impracticable from any circumstance, the treatment may consist in endeavouring to bring the patient quickly under the influence of opium, persevering with its administration as set forth in our directions for the treatment of acute peritonitis.

Sometimes perforation is not so sudden, and the patient may have complained for a few days, or even weeks, of vague pains in the right iliac region, with some symptoms of dyspepsia, flatulence, and constipation. There may be a rigor, an evening rise of temperature, loss of appetite and thirst, then somewhat sudden symptoms of perforation may appear, from rupture of an abscess which has formed round the appendix, and the discharge of its contents into the peritoneum. Such an untoward event has been even known to follow medical examination. The treatment of such a case is, of course, the same as the preceding.

But of the more common and **chronic forms of appendicitis** we may distinguish two groups—*first*, the cases of so-called relapsing appendicitis, regarded by some as "catarrhal" forms, with little tendency to suppuration; and *second*, those cases which terminate in *localised* suppurative peritonitis, limited by adhesions, and caused usually by ulcerative perforation of the appendix.

The symptoms attending the first of these groups consist of recurrent attacks of pain in the right iliac fossa, days and weeks, and even much longer periods, of freedom from pain intervening between the attacks; and on local examination a tumour is often to be felt deep in the right iliac region, tender on pressure. The attacks may be accompanied by sickness, flatulent distension of the abdomen, and constipation. With absolute rest in bed, opiate fomentations, and belladonna and opiate liniments applied locally, a diet restricted exclusively to fluids, such as broths, clear soups, and the like, and daily large enemata of warm soap and water with olive oil,

to soften and bring away all fæcal accumulations without causing any irritation or excitement of the muscular coat of the bowel; with such careful expectant treatment the great majority of these cases quiet down and get well.

When, however, these attacks continue to recur and become more severe at each recurrence, when there is a distinct tumour perceptible in the region of the appendix, and when the patient is disabled from work and anxious for relief, Treves' suggestion may be carried out, and an operation undertaken, "during a quiescent interval," for the removal of the enlarged and inflamed appendix.

In these relapsing non-suppurative cases it must be remembered that the recurrent attacks of localised adhesive peritonitis are apt to lead to constriction of the bowel, and thus to cause serious obstruction; a possible result which may be avoided by the removal of the appendix.

In the *second* group of cases, where there is evidence of suppuration having occurred, after a brief delay to observe the effect of suitable treatment by rest, careful feeding, and opiates, if there is no marked improvement, but rather an aggravation of the symptoms, with a daily evening rise of temperature,* the abscess round the appendix should be freely opened by an incision directly over it, the pus evacuated, and the abscess cavity drained. A brief search may be made for the appendix, but this must not be pushed too far, owing to the risk of breaking down adhesions and opening a communication with the general peritoneal cavity. If found it should be ligatured and removed.

Punctures with exploring needles should be avoided in these cases, as serious disasters have followed such explorations.

* Some have urged that rapidity of pulse is a special indication for operation; but the pulse rate is so variable and uncertain in nervous persons, and so *very easily* raised 10 or 20 beats, that, *taken by itself*, we do not regard it as a trustworthy indication.

With regard to the treatment of those comparatively rare cases of perityphlitis from fæcal impaction in the cæcum and stercoral ulcer, which sometimes occur in young or middle-aged persons who suffer from a tendency to obstinate constipation, if we are enabled to arrive at a diagnosis to this effect, as a careful consideration of the history of the case will often enable us to do, we should be in no hurry to have recourse to operative interference.

Such attacks are preceded by constipation, intestinal discomfort, flatulence, distension, and pain especially referred to the right inguinal or lumbar region. Some localised tenderness will be found over the situation of the cæcum and adjacent portions of the ascending colon, not limited to any particular spot, as is sometimes the case in *appendicitis*,* but diffused over those portions of the first part of the large intestine we have mentioned. On palpation and percussion this part of the intestine will be felt to be distended and dull; indeed, to the experienced physician there is very little difficulty in distinguishing this comparatively mild form of *perityphlitis* from the more serious *appendix* cases already referred to. There is often some rise of temperature, but rarely higher than 101° or 102° F., with restlessness, a furred tongue, foul breath, and a bad taste in the mouth.† These febrile symptoms are not always caused by a local peritonitis, but are sometimes dependent, we believe, on superficial catarrhal ulceration of the mucous membrane and absorption of fæcal toxins.

Now the paramount **indication for treatment** in these cases is to evacuate the fæcal matters which are

* McBurney has pointed out that the most important diagnostic sign in connection with inflammation of the appendix is the invariable presence of a minute point of exquisite tenderness, almost exactly two inches from the anterior iliac spine, on a line drawn from this process through the umbilicus; but the invariable presence of this sign is not universally admitted.

† For a fuller account of this form, *see* Treves, on "The Cæcal Form of Perityphlitis," Allbutt's "System of Medicine."

retained in this portion of the intestine, and which are distending it and irritating it, and giving rise to the symptoms detailed. If such a case be treated as many authorities direct an appendix case to be treated (and some seem to include even these mild forms of perityphlitis in their general directions for treatment), and *opium* be freely given internally, the case will be made a protracted one, the tendency to obstruction will be intensified, the general sub-febrile condition will be aggravated instead of relieved, and the patient, who might have been comparatively well in a few days, will very likely be ill for weeks; for opium aggravates the paresis of the intestinal walls (and we have seen its administration pushed until an almost paralytic condition of the intestine has been induced), it diminishes all the intestinal secretions, and increases the febrile state due to absorption of retained excrementitious substances.

There is, however, no possible objection to the *local* application of opium, and it will generally be found that the pain can be effectually relieved by the application of hot linseed poultices sprinkled with laudanum; or the mixed opium and belladonna liniments may be applied on warm lint or flannel over the seat of pain and tenderness.

In these cases, as well as in others in which the appendix is involved, but which do not call for operation, although the symptoms are persistent, the application of 5 or 6 leeches over the seat of swelling and pain has been recommended. Treves says "this measure very often has a magical effect."

To evacuate the contents of the intestine we should at first trust entirely to enemata; large enemata of warm soap and water, with which 2 or 3 ounces of olive oil have been mixed, should be slowly injected with a long tube, the patient's buttocks being raised so as to favour the retention of the enema. An enema of this kind should be administered every few hours until complete relief has been obtained.

If we find that there is no longer any local pain

or tenderness, gentle manipulation of the distended bowel may serve to assist in dislodging any remaining impacted fæces; and no harm can now arise from the use of a gentle saline aperient with a small dose of calomel. A powder composed of ¼ grain of calomel with 2 or 3 grains of sugar of milk, and followed by 4 or 6 ounces of Dinneford's fluid magnesia, to which a teaspoonful or two of lemon juice should be added, is as gentle an aperient as it is possible to give, and causes no excitement of the muscular wall of the intestine. When it is clear that a somewhat stronger aperient can be given without any risk, two-dram doses of sodium sulphate dissolved in 1½ ounce of peppermint water may be given every four hours, until the bowels are completely relieved.

There is a wide difference of opinion between authorities as to the use of aperients in cases of appendicitis. Osler maintains that the "use of saline purges early in the disease is a most injurious practice," but then Osler is one of those who think "there is no medicinal treatment of appendicitis."* Treves, on the other hand, says, "If the onset be mild a purgative should be given at once. Over and over again an attack has been cut short by a promptly administered aperient." The explanation of this divergence of opinion lies, we think, in the fact that some writers have only the experience of hospital cases before them and know little about the great number of mild cases, associated with chronic dyspepsia and habitual constipation, that are seen in private practice. The experienced physician usually has little difficulty in distinguishing the cases in which an aperient may be given from those in which it would act injuriously.

When all tenderness has disappeared, and there is no longer any rise of temperature, a mild aperient should still be given daily for some time, until the bowel has recovered its tone. To promote the latter a tonic containing nux vomica, gentian, and ammonia will be useful. Intestinal antiseptics should be given

* "Principles and Practice of Medicine" (fourth edition), p. 530.

by the mouth in these cases, if there is evidence of fæcal intoxication such as foul breath, a bad taste in the mouth, and a slight diurnal rise of temperature. *Salol* in 10-grain doses three times a day will answer this purpose, or a grain of *thymol* made into a pill with soap powder and spirit may be given instead. Such intestinal antiseptics would also favour the healing of any intestinal ulceration that may possibly exist.

The patient should, of course, be kept at rest in bed for some time, and until quite free from pain, and only fluid food, such as broths, clear soup, gruel, and occasionally a beaten-up egg, should be prescribed. A cup of tea or coffee with peptonised milk may also be allowed.

The occasional recurrence of pain and tenderness over the cæcum and ascending colon, which not unfrequently follows an acute attack, we have found relieved by the application of iodine paint.

We cannot dismiss the subject of the treatment of appendicitis without a brief reference to the controversy that has arisen with regard to the propriety of early operation in nearly all cases; and the statement, repeated by many, that "there is no *medical* treatment" of this disease. Broca* has recently protested strongly against what he terms the *fièvre opératoire*, and observes, "Since I have learnt to weigh the indications for operation, instead of operating always and immediately, I have seen the mortality diminish." Moreover, even in the cases in which he considers operations to be indicated, he opposes the idea that operation should be done hastily and immediately, and he produces evidence to show that "*l'opération immédiate est plus grave que l'expectation armée*," and he points out that "with suitable and early medical treatment, complete resolution is frequent, and amelioration is the rule." Treves, also, is stoutly opposed to indiscriminate and hasty operation, and is *not* on the side of those who declare

* "L'Appendicité," Paris, 1900.

"there is no *medical* treatment of appendicitis." He believes the mortality from this disease has been greatly exaggerated owing to the elimination of the slighter cases in hospital statistics. "It is probable the mortality of perityphlitis, taking all phases of the disease together—the most trifling attacks with the most serious—is about 5 per cent." Again, Treves remarks: "The number of cases which undergo spontaneous cure form an overwhelming majority, and cannot be lost sight of; nor can the opening of the abdomen through the muscular parietes over the cæcum be regarded as a trifling procedure." With regard to the statement that "cases have ended fatally within the first 36 hours by perforation into the general peritoneal cavity," he observes: "Such cases are exceedingly rare; they cannot be anticipated, and they are not difficult to recognise." As to relapsing cases, he says, "The circumstances which would justify an operation in these cases must be precisely defined, and it *cannot be too emphatically stated* that in a fair proportion of instances in which the trouble has relapsed, *no surgical interference* is called for. In some examples of the relapsing form, much can be done by the medical means already described, by diet, by attention to the bowels, and by placing the patient under conditions more favourable to a state of peace within the abdomen."

We have quoted largely from Sir F. Treves' article because, although writing as a surgeon and with a very large surgical experience, he fully recognises the importance and efficacy of *medical* treatment in the majority of cases of perityphlitis.

Finally, as to *preventive* measures in persons who have recovered from an attack. All indigestible substances should be banished from the dietary, all vegetables must be reduced to the form of soft purées, coarse brown bread must be avoided, the soft pulp only of fruits taken; milk should be freely diluted with barley water or some alkaline mineral water, so that it may not accumulate as indigestible curds in the

cæcum. All solid foods must be well masticated; the meals should be small in amount, and eaten slowly. Pure water should be freely consumed, but it should not be hard water containing much lime salts. A large glass of water at bed-time and another on rising in the morning should be taken. The bowels must be made to act daily—for this purpose a dinner pill may be prescribed, or a claret glass of Apenta water drunk fasting in the morning. All violent and active exertions must be avoided. An abdominal belt should be worn.

DYSENTERY.

Dysentery is a disease, or, as some believe, a group of diseases, characterised by symptoms referrible to inflammation, usually associated with ulceration of the mucous membrane of the large intestine.

Much difference of opinion has existed with regard to the *etiology* of dysentery. Some have regarded climatic conditions, such as great heat and moisture, as in tropical countries, or great and rapid alternations of temperature, or marsh malaria, as of themselves efficient causes of dysentery. Others have referred the occurrence of the disease to exposure to cold and wet, to over-fatigue, and to eating unripe fruits. But now the more generally accepted view is that its essential cause is a **specific germ or germs** (varying according to the particular form of the disease), and that the disease is propagated by contagion and infection. The *amœba coli* has been described as the cause of a special type of dysentery, hence termed *amœbic* or *tropical dysentery;* but it cannot be regarded as common to all forms of dysentery, for the most careful and experienced observers have failed to find it in many outbreaks,* and it has not been

* Bacteriological studies have been undertaken by many capable observers, but, as yet, no completely definite and certain results have been established. A good account of these investigations is given by Professor Flexner (*Brit. Med. Journal*, September 29th, 1900, "Etiology of Tropical Dysentery"). With regard to the asserted causal relation of amœbæ with dysentery,

found in the form of dysentery encountered during the war in South Africa.

It is said to occur *sporadically* in very hot seasons in temperate climates, but this is very rare; *endemically*, it is found to occur continually in certain hot countries, such as Hindostan, Cochin-China, Algiers, Egypt, etc., and although it may in some instances be found to co-exist with *malarial* affections, such as ague and hepatitis, yet it is found also to occur in countries quite free from malaria, and to be absent from others where malarial affections are common. It would appear, therefore, to have a different origin to that of ordinary malarial diseases.

Its extreme frequency and fatality as an epidemic amongst armies in the field show clearly that the massing together of great numbers of men under conditions of life which must necessarily, at times, be the reverse of hygienic, is most favourable to its origin and propagation. This fact is not inconsistent with the opinion that it is propagated by a specific germ; for in camps there often exist all the conditions most favourable to the diffusion of such a cause of disease, while every *predisposing* cause, such as over-fatigue, exposure to wet and cold, mental depression, unsuitable or insufficient food, and overcrowding, are at times in operation.

The disease may originate in the use of impure water for drinking, just as typhoid fever does, and then be rapidly propagated by the further contamination of the water supply by dysenteric stools. In war, foul latrines, in which the air becomes charged with fœtid organic emanations, are stated to be a common cause of dysentery,* the effluvia from dysenteric stools being especially injurious.

he concludes that "while amœbæ are commonly present and are concerned in the production of the lesions of sub-acute and chronic dysentery, they have not thus far been shown to be equally connected with the acute dysenteries even in the tropics. In the former varieties bacterial association probably has much influence upon the pathogenic powers of the amœbæ."

* Parkes' "Hygiene."

The reason of its constant *endemic* prevalence in certain tropical countries is to be accounted for by the fact that heat and moisture favour the propagation and diffusion of the specific germ, and also probably by the unhygienic habits of the natives.*

The **symptoms** presented by sufferers from dysentery depend on whether the disease is acute or chronic, on the type or form of the disease, and on the extent to which the inflammation, ulceration, sloughing, or thickening of the intestine have spread.

We shall only here enumerate the more characteristic ones. In acute cases at first there are abdominal pain and diarrhœa, the motions soon becoming *dysenteric;* that is to say, they contain a mixture of yellowish-white mucus and blood. The evacuations are preceded by painful tenesmus, especially referred to the region of the anus, and often involving the bladder, and there is a constant desire to evacuate the bowels, which usually only results in the passage (with much straining) of a small quantity of mucus and blood. There is pain and tenderness along the course of the large intestine, and the mucous membrane of the rectum is hot and inflamed, and intensely sensitive. As the ulcerative process advances, the motions are found to consist chiefly of glairy mucus, pure blood, and shreds of mucous membrane, which have been spoken of as "intestinal scrapings," with which hard fæcal masses are occasionally seen to be mixed. In severe epidemic cases the patients are harassed with a constant desire to go to stool and to urinate, which they do from fifty to 200 times in twenty-four hours. The pain is relieved after each stool. As the disease advances, the motions become horribly fœtid, and the mucus gives place to a reddish sanious fluid,

* Dr. Manson alludes to "a very fatal type of dysentery, euphemistically termed 'colitis,' which is the scourge and disgrace of more than one of our English lunatic asylums" ("Tropical Diseases," new edition, p. 335); and Dr. Washbourn has expressed his belief that this is the same disease as the form he had met with in South Africa (*Clinical Journal*, Aug. 28th, 1901).

containing fragments of membrane, and mixed with a considerable quantity of pus. Together with these local symptoms there is in some forms much thirst and fever, with dry skin, rapid emaciation, loss of strength, and exhaustion from the constant intolerable pain, tenesmus, and loss of blood.

Sporadic cases usually run a much milder course, and the symptoms are by no means so severe. Dr. Washbourn, from his experiences in South Africa, is disposed to regard those cases that have been described as "simple colitis" and "ulcerative colitis," such as prevail in certain lunatic asylums, as sporadic cases of the same disease.*

Several clinical varieties of dysentery have been described.

1. A *benign sporadic* form, in which there is little or no fever, not more than ten or twelve evacuations in the day, and which usually results in cure in seven or eight days.

2. An *inflammatory* form with high temperature, hard, rapid pulse, dry, raw, red tongue, and *not* very frequent stools.

3. A *bilious* form, in which the stools are *diarrhœic* as well as *dysenteric*, and contain yellowish or greenish bilious matters. There are nausea and vomiting, a coated tongue, and only slight fever.

4. A *rheumatic* form, with an affection of the joints resembling sometimes gonorrhœal rheumatism; more commonly fugitive pains appear in the joints, muscles, and intercostal spaces (pleurodynia).

5. An *intermittent* form characterised by remissions and exacerbations of severity.

6. An *adynamic* or *malignant* form marked by great prostration, and prominence of symptoms referrible to the nervous system, muscular tremors, restlessness, delirium, and fatal coma.

7. A *chronic* form, a sequel usually of several acute attacks. The stools are sero-purulent, but usually free from blood; the anus is relaxed; a dull, heavy pain

* *Clinical Journal*, Aug. 28th, 1901.

replaces the tenesmus; the belly is flat and retracted, and painful when pressed on. There is no fever and the appetite is often good, but there is generally great emaciation.

Some authors notice particularly the absence of bile in the stools, and it has been pointed out that in severe cases all the digestive secretions are changed or entirely checked. The saliva becomes acid, and loses its glycogenic properties, the gastric juice becomes alkaline, and can no longer form peptones, while the secretion of bile is wholly arrested.

Attention to the following **indications** will assist us in the **treatment** *of cases of dysentery*:—

1. To relieve the pain and tenesmus in acute cases.

2. To avoid all irritation of the inflamed mucous membrane.

3. To remove foul accumulations from, and to arrest putrefactive processes in, the large intestine (*intestinal antisepsis*).

4. To promote (especially in chronic cases) a restoration of healthy action in the catarrhal and ulcerated mucous membrane.

5. To counteract any morbid septic agency in the blood.

6. To support the patient's strength.

7. To prevent the diffusion of the disease by suitable prophylactic measures.

1. Whatever differences of opinion may exist with regard to the free use of opium in acute dysentery—and there are some who object strongly to its administration—there can be none as to the necessity of its *limited* application, to allay the extreme distress of the patient, until other more slowly acting remedies can take effect. There should be no hesitation in attempting to at once relieve the pain and tenesmus in the rectum by the local use of opium. It is not intended to check the action of the bowels by its use, or to lock up offending fæcal masses in the inflamed bowel, but it is simply given to relieve pain and to

moderate and modify the morbid painful muscular contractions of the large intestine. For this purpose a morphine suppository is convenient, if it can be retained in the bowel, or opium in the form of a small enema may be given, which may be repeated in half an hour if the first one or two should be quickly rejected. As the anal orifice is often excessively tender and sensitive, the enema must be given gently, and with care, a small flexible tube being used, which should be passed up several inches into the bowel. If there should be any difficulty on account of irritability of the anus, this may be readily overcome by brushing the anal mucous membrane with solution of cocaine. The enema tube should also be well oiled.

Each enema should consist of 15 minims of laudanum with 1 ounce of cold mucilage of starch. Some prefer to give a hypodermic injection of morphine, $\frac{1}{6}$th of a grain. Whichever method is adopted, it must be remembered that it is only a temporary expedient for the relief of a distressing symptom.*

2. To avoid all irritation of the inflamed mucous membrane, the patient must keep absolutely at rest, and, in all but the slightest cases, at rest in bed; he must pass his motions into a bed-pan, and not be allowed to resort to a water-closet. The abdominal surface may be gently rubbed with opium liniment and hot flannels kept applied there; hot bottles should also be applied to the feet, and the patient kept thoroughly warm with plenty of blankets.

All irritating ingesta, or food which leaves a residue prone to decomposition, must be avoided. Milk is the best food, if it can be prevented from clotting in the bowel. It may be boiled, and then diluted with iced water, and made slightly alkaline by adding to each glass a few grains of sodium bicarbonate. It is exceedingly undesirable that any

* Dr. Washbourn states that he has seen lives saved in South Africa by relieving the distressing tenesmus by morphine suppositories (*Brit. Med. Journal*, June 16th, 1900).

undigested curd of milk should reach the large intestine; the milk should therefore be diluted and rendered distinctly alkaline, or it may be peptonised. A little thin arrowroot may be mixed with the milk, and forms a useful and unirritating food, while it prevents the milk forming hard curds.

Great objection has been taken to the use of strong meat extracts in dysentery on account of their proneness to decomposition, but we can see no possible objection to light broths and clear soups flavoured with the expressed juice of fresh vegetables, as these leave no solid residue, and they are often grateful and refreshing to the feverish and exhausted patient. Some authorities object even to milk in the most acute stage, and when the tongue is foul they would limit the food to weak chicken broth, barley water or rice water, and a little egg-albumen, until the tongue cleans.

Stimulants, unless in cases of much exhaustion, should be avoided, and when given should consist of small quantities of brandy and water or brandy and milk. A teaspoonful of brandy with a tablespoonful or two of warm coffee is an excellent stimulant.

3. The next indication is to remove foul accumulations in contact with the inflamed and ulcerated mucous membrane, and to check the putrefactive processes in the large intestine. This is, in short, to carry out **intestinal antisepsis.** There are two ways of effecting this—(*a*) by gently-acting aperients, which will sweep away toxic and putrid accumulations from the intestine; and (*b*) by irrigation, or washing out the intestine by cleansing or antiseptic fluids.

After we have allayed the severity of the pain and tenesmus by morphine or opium, as already described, we need have no difficulty or hesitation in carrying out the present indication.

As an aperient an initial dose of castor oil may be given, and this may be followed, in acute cases, either by the ipecacuanha treatment, or treatment by the

aperient sulphates of magnesium or sodium. Both methods are undoubtedly efficacious, and each has its advocates. Washbourn, from his recent experience in South Africa, considers ipecacuanha and magnesium sulphate both specifics for the disease, but he regards ipecacuanha as the most efficacious, as he has seen it cure cases which had resisted the action of sulphate of magnesium.

Ipecacuanha has been given in various ways and doses. Some physicians give it in large doses, 20 to 40 grains every four to twelve hours, according to its tolerance by the patient. Its tolerance is promoted by the administration previously of a dose of opium, or by the addition of some opium to each dose of ipecacuanha.

The patient having been kept a few hours without food, the plan usually adopted is to first quiet the stomach by a dose of opium (10 minims of Battley's solution will suffice), and then to give, an hour afterwards, 30 grains of powdered ipecacuanha in as little fluid as possible, so as to avoid its rejection by vomiting. The patient is told to keep very still in bed and to try and not vomit. A little ice may be sucked, or a tablespoonful of iced water swallowed. After four to eight hours another dose should be given, and the remedy should be continued for some days, if necessary, in diminishing doses.

Ipecacuanha has also been given in the form of *enemata*, and we may resort to this method when we encounter great intolerance of this drug by the stomach, and in young children. One or two drams of the powder should be infused in 10 ounces of boiling water, and when cold, a half or the whole of this may be injected with a long tube into the bowel. It has been stated that ipecacuanha from which the emetine has been extracted—*ipecacuanha sine emetina*—is equally useful in dysentery, and has the advantage of not causing vomiting even in large doses.

But experience with this form in South Africa has

not been satisfactory and it is doubtful if it can take the place of the unaltered drug.

The experience of American physicians is not favourable to the ipecacuanha treatment, and they prefer the use, in acute cases, of the **aperient sulphatis,*** a mode of treatment which meets also with much favour in this country. Magnesium or sodium sulphate† may be used, and in the following manner:—One dram dissolved in half an ounce of water is given every hour until the motions become fæcal, and continued, less frequently, for twenty-four hours. After the disappearance of the acute symptoms the diarrhœa which remains may be treated with bismuth and opium.

This method is really *antiseptic* and eliminative, as it aims at sweeping away from the intestines irritant toxic and putrid substances.

A more direct way of carrying into effect the indication we are considering, and a useful supplement often to the preceding, is the **irrigation** of the large intestine by **antiseptic** fluids; it is, however, more applicable to sub-acute and chronic than to acute cases.

A solution of borax, 5 grains to the ounce, or of borax and bicarbonate of soda, 5 grains of each to the ounce, with a few drops of spirits of camphor or tincture of eucalyptus, makes an excellent irrigation fluid for this purpose. The solvent action on mucus of the alkaline solution helps to detach and bring away foul inspissated mucous masses adherent to the diseased membrane, and to cleanse the surface of the ulcers and promote their healing. No treatment can be more rational or respond more directly to the anatomical and symptomatic indications of the disease than this method of antiseptic irrigation.

Various other substances have been used as enemata in dysentery—some of them more for their

* *Vide* Hare's "System of Practical Therapeutics," vol. ii. p. 481 (second edition), 1901.

† *Vide Brit. Med. Journal*, Feb. 10th, June 16th, and Dec. 12th, 1900; and Jan. 26th, 1901.

astringent than their antiseptic action. But in acute cases the simple and unirritating antiseptic enemata are the best.

Large irrigating injections of solution of nitrate of silver, 20 or 30 grains to the pint, have found much favour with American physicians. Osler insists on the necessity of *large* injections of from 3 to 6 pints, the warm fluid being allowed to flow into the bowel through a long tube. He has also used warm injections of quinine, 1 in 1,000 to 1 in 5,000, in amœbic dysentery with great benefit. The amœbæ are rapidly killed by it.

Iodine has also been employed with advantage in the proportion of 20 to 30 minims of the tincture to an ounce of water.

Salicylic acid, charcoal, chlorine water, creasote emulsions, perchloride of mercury, and decoctions of bark and chamomile have all been advocated for the same purpose, and some use simple iced water.

Enemata of *creolin*, $\frac{1}{2}$ per cent. or 1 per cent. solution, have been given with much success by some Continental physicians. Large enemata, from 4 to 6 pints, have been given, twice or three or four times a day. They are said to be absolutely non-irritant to the bowel.

That this treatment by irrigation should be successful it must be carried out by the physician himself or a thoroughly trustworthy assistant. From 3 to 4 pints are as much as can be safely introduced in the adult. The patient should lie on his back or on his left side, with his head low and the hips raised, and the injection be introduced slowly by a funnel, or fountain and tube. "This should always be done under low pressure and slowly, in order that the fluid may have time to distribute itself beyond the points of entrance. This will avoid the danger of over-distension and possible rupture of the thin-walled intestine when ulceration has occurred."* If pain is

* Hare's "System of Practical Therapeutics," vol. ii., p. 483 (second edition), 1901.

complained of, we must desist injecting for a few minutes, and then inject more, until the maximum possible is reached.

It has been said of these irrigations and large enemata that "they cause great distress and no appreciable benefit," and that they are "risky,"* owing to the ulcerated and softened state of the coats of the bowel; and that they cannot be made to reach the cæcum except by "violent massage"! To apply "violent massage" ought not to be thought of, and the mere suggestion of such a proceeding excites the suspicion that insufficient caution and care in the application of this method has led to these objections to it.

4. The next indication has been to a great extent anticipated in the preceding, for *intestinal antisepsis* properly carried out is better calculated than any other means *to promote* a restoration of healthy action in the catarrhal and ulcerated mucous membrane. But in chronic and sometimes in acute cases the catarrhal state set up by the disease in the intestinal mucous membrane needs the employment of **astringent** remedies.

Bismuth (the subnitrate, carbonate, or oxy-chloride) is one of the best remedies for this purpose.

Twenty grains of the subnitrate with 5 grains of Dover's powder, 5 grains of light magnesia, a dram of mucilage of tragacanth, and an ounce of infusion of simaruba may be given twice or thrice a day. Much larger doses of bismuth than this have been given—30 to 60 grains every two hours; these large doses act, perhaps, as much by their antiseptic as their astringent property. Stronger astringents are sometimes required—a dram of tincture of catechu may be added to each dose of the preceding, or 10 grains of extract of logwood.

In old and obstinate cases acetate of lead (4 grains of the *pil. plumbi cum opio* three times a day, or a *suppositoria plumbi cum opio* twice a day), or sulphate

* Watkins-Pitchford, *Brit. Med. Journal*, Nov. 10th, 1900.

of copper ($\frac{1}{4}$ grain in a pill with 3 grains of Dover's powder, three times a day, or a rectal injection of 10 grains of sulphate of copper, 20 minims of tincture of opium, and 4 ounces of water), or nitrate of silver ($\frac{1}{4}$ grain made into a pill with 2 grains of kaolin ointment, and with or without $\frac{1}{2}$ a grain of powdered opium, three times a day), have all been found useful.

5. The fifth indication is to correct any morbid septic agency in the blood. It seems probable that ipecacuanha may act as a microbicide, and arrest the development of the specific germ of this disease.

In cases in which the dysentery is clearly associated with malarial intoxication, quinine must be given in full doses.

Maclean recommends that 20 grains of quinine in solution (we would suggest in lemon juice) should be given before the ipecacuanha treatment is begun, and that then these two drugs should be given alternately until the characteristic effects of both are produced.

In chronic malarial cases it may be desirable to prescribe arsenic; $\frac{1}{60}$th of a grain of arsenious acid, or $\frac{1}{120}$th of a grain of arsenate of soda, gradually increased, may be given in a pill three times a day after food.

In scorbutic cases the fresh Bael fruit has been strongly commended by Anglo-Indian physicians. Lemon and lime juice may also be given, and fresh ripe fruit and vegetables. Manson speaks well of a decoction of *simaruba* in sub-acute and chronic cases;* and a tincture of *Monsonia ovata*, a South African plant, has been highly praised by Dr. Moberly.†

6. We must support the patient's strength by nutritious **food.** During the onset of the acute attack little food should be given, as little as can be assimilated, as the residue would simply act as decomposing foreign substances irritating to the diseased intestine. Milk is, as we have said, the best food in these cases, diluted with water or barley water, or mixed with a

* "Tropical Diseases" (new edition), p. 343.
† *Lancet*, Feb. 6th and 13th, 1897.

little thin arrowroot. If we notice that curd of milk passes in the stools, we must replace the milk by whey or weak animal broths and thin soups.

In carrying out the ipecacuanha treatment, if much nausea and vomiting are excited, it is important, in order that the patient's strength be not exhausted, that sufficiently long intervals between the doses should be allowed for the administration and assimilation of nourishment.

If there is great prostration, alcoholic stimulants must be given: a pure spirit, either brandy or whisky, or sound port or Burgundy, mixed with water, may be prescribed in the quantity necessary. Ether and caffeine hypodermically, and saline injections, have been employed with success in cases in which life appeared to be endangered by hæmorrhage and anæmia, with prostration and collapse.

After the severity of the acute stage is over, and when appetite and digestive power have returned, a more liberal diet should be allowed. Eggs, whipped up with boiling water, and a little nutmeg and brandy and cold milk added, are an agreeable and highly nutritious form of food. Pounded sweetbread or chicken, or finely-divided raw meat, or pounded meat and crumb of stale bread may be added to broth, clear soup, or thin cocoa. When convalescent, tender meat, fowl, fish, eggs, milk, ripe fruits, and fresh vegetables may be given at suitable intervals, and in proportion to the digestive capacity.

We should seize the earliest opportunity of further supporting the patient's strength by suitable tonic medicines. Bark, quinine, nux vomica, simaruba, nitro-hydrochloric acid, the several preparations of iron, may all in their turn, alone or combined, be given with advantage.

Dujardin-Beaumetz maintained that there was only one treatment for **chronic** dysentery, viz. an exclusive milk diet: best taken, together with baths, at Vichy.

Change of climate is often necessary to restore

completely the strength of the dysenteric patient. A sea-voyage, removal to a bracing sea-coast, or a moderately high mountain resort, or a dry, bracing upland, may be chosen, according to circumstances.

If troublesome constipation be a sequel, a course of mineral waters at Carlsbad, Kissingen, Tarasp, or Brides-les-Bains may prove very serviceable.

7. We finally come to the important indication of adopting proper **prophylactic measures.**

One of the most important of these is the proper treatment of the dysenteric stools. They should either be mixed with sawdust and burnt, or buried in the soil a few feet below the surface, boiling water having been previously thrown on them. They must not be emptied into water-closets or privies. If it is not possible to avoid this, they should be first treated freely with carbolic acid and boiling water. The sick room should be well ventilated with open windows, the bedding frequently changed, and all articles soiled by the discharges plunged into boiling or very hot water.

Individuals exposed to contagion and during epidemics should avoid all predisposing causes. All drinking water, unless absolutely free from possible suspicion, should be boiled, and milk also. All articles of food should be avoided that have any tendency to excite intestinal catarrh, and that are indigestible, as unripe fruit, coarse vegetables, etc. Avoidance of foul latrines and water-closets should be insisted upon. Warm clothing, and especially a flannel band round the abdomen, should be worn, as chill predisposes to most infectious microbic diseases. Removal from the infected area, when possible, is, of course, advisable.

In the management of armies and other large bodies of men it is especially important to look to the supply of drinking water, to avoid overcrowding, to provide proper food, properly cooked, and to secure habits of personal cleanliness and the proper disposal of refuse.

ADDITIONAL FORMULÆ.

Astringent pills in dysentery.

℞ Argenti nitratis, gr. ½.
Pulveris opii, gr. $\frac{1}{10}$.
In pil. To be taken an hour after meals (*Packard.*)

Enemata in dysentery.

Various *antiseptic* and astringent substances have been successfully applied in enemata. Free irrigation with warm water has been found as useful as any. (*Korytin.*)

One per cent. solution of carbolic acid.

Bichloride of mercury, daily injection of 7 oz. of a 1 in 5,000 solution.

℞ Quininæ sulphatis, gr. x.
Tincturæ camphoræ compositæ, ʒiv.
Decocti amyli ad ʒj.

This, warmed, is to be injected slowly *after* the bowel has been washed out with 1½ pint of warm water. (*Poynder.*)

Creolin, 1 dram to a pint of water. (*Watson.*)

Alum, ½ oz. to ½ pint of water twice daily. (*Hepburn.*)

Bisulphide of carbon, 1½ gr. in 1½ oz. of water twice daily. (*Jakotleff.*)

Sulphate of copper, 10 grains with 1 dram of laudanum and 4 oz. of water. (*Easby.*)

℞ Argenti nitratis, gr. ij ad gr. viij.
(For children, gr. jss.)
Aquæ destillatæ, ʒv.

To make four enemata, two to be given daily. (*Bamberger.*)

℞ Naphthalini, gr. lxxv.
Olei olivæ, ʒv.

To be injected high up three or four times a day. (*Minerbi.*)

Suppositories for dysentery.

℞ Acidi tannici, gr. xv.
Opii, gr. ijss.
Olei theobromatis, ʒijss.
To make four suppositories. (*Bamberger.*)

Another.

℞ Naphthalini, ʒijss.
Olei theobromatis, ʒijss.
To make five suppositories. (*Minerbi.*)

In membranous colitis and in chronic dysentery copious injections containing bismuth have been found very efficacious. 3 drams of bismuth subnitrate and 3 drams of sodium salicylate are mixed with a pint of mucilage (of quassia seeds). The colon is first cleaned out with a castor-oil enema and then with one of solution of boric acid. The bismuth injection must be retained, if possible, for twenty-four hours. To ensure this a smaller quantity may have to be given. (*Revilliod.*)

Antiseptic and sedative mixture in acute dysentery.

℞ Izal, ♏iij.
Bismuthi subnitratis, gr. x.
Tincturæ chloroformi et morphinæ, ♏viij.
Mucilaginis acaciæ, ad ʒj.

M. fiat haustus. To be taken every two, four, or eight hours, according to the severity of the symptoms. (*Watkins-Pitchford.*)

Mixture for acute dysentery.

℞ Magnesii sulphatis, ʒj.
Acidi sulphurici diluti, ♏xij.
Aquæ menthæ piperitæ, ad ʒj.

M. f. haustus. To be taken every hour until the stools become fæculent. (*Day.*)

Medicated enemata for amœbic dysentery.

Quinine sulphate, 1 in 5,000 to 1 in 1,000.
Perchloride of mercury, 1 in 10,000 to 1 in 5,000.
Hydrogen peroxide, 1 in 20 to 1 in 5.
Methyl blue, 1 % to $\frac{1}{10}$ %.

The enema should be given once or twice a day. (*Aderhold.*)

CHAPTER XII.

DISEASES OF THE INTESTINES—THE TREATMENT OF INTESTINAL OBSTRUCTION.

Intestinal Obstruction, Acute and Chronic: Its Nature and Seat often difficult to ascertain—Its Causes: (1) Accumulations within the Canal: (2) Compression or Constriction from without: (3) Stricture, Malignant, Cicatricial, or Peritonitic: (4) Strangulation or Incarceration, External and Internal: (5) Positional Lesions (Intussusception, Twisting, Kinking, etc.) (6) Paralytic or Sub-paralytic Condition of the Intestinal Walls. *Diagnostic* Measures—Rectal Exploration—External Manipulation—Percussion—General Symptoms—Acute Intussusception—Its Symptoms—Gall-Stones—Previous Attacks of Peritonitis. *Treatment* of Simple Compression or Traction—Fæcal Impaction—Stricture—Caution in use of Opium—Needful in Acute Cases—External Applications—Ice—Warmth—Opium—Taxis—Large Enemata of Warm Water—Intussusception Cases—Injection of Air—Prolonged Warm Baths—Puncture to relieve Distension—Nutrient and Supporting Enemata—Operative Measures—Diet.

OBSTRUCTION or closure of the intestinal canal may arise from a variety of causes, but certain symptoms are necessarily common to all. The chief clinical and symptomatic distinctions will depend upon whether the closure of the intestine has been brought about suddenly and unexpectedly, or slowly and gradually; whether, in short, it is what is termed *acute* or *chronic*.

Certain differences also in the clinical manifestations will arise according to the situation of the obstruction, *i.e.* according as it is situated in the upper or lower part of the intestinal canal, and further, according to the completeness or incompleteness of the obstruction.

Although from the similarity, and, in many instances, the identity of the phenomena attending those cases, the treatment appropriate to them is the same, even when their causal relations remain obscure, yet in all instances, in order to institute the most appropriate treatment, it is desirable, and in many cases it is essential, to arrive at an accurate estimation of the

nature and seat of the obstruction. It will, therefore, be necessary to review briefly the chief causes of intestinal obstruction, and to mention whatever distinctive symptoms have been observed to characterise the different varieties.

1. The intestinal canal may be blocked by substances that have **accumulated within it,** such as indigestible substances taken with the food, or foreign bodies of any kind, insoluble matters taken in the form of medicines (large and repeated doses of peroxide of iron or magnesia), masses of intestinal worms, or of indurated fæces, and by large biliary and intestinal concretions. (Gall-stones large enough to obstruct completely the small intestine sometimes ulcerate their way from the gall-bladder into the intestine through the walls of both ; calculous deposits also occasionally form within the intestinal canal itself, composed generally in great part of concretions of phosphate and carbonate of lime.)

2. The intestine may be obstructed by **compression** or **constriction** arising *externally* to it. Tumours, glandular, vascular, or visceral, benign or malignant, or displaced viscera, may compress adjacent intestine, and cause its partial or complete occlusion. In this way the rectum may be compressed by a displaced uterus, or by a uterine or other pelvic tumour.

Sometimes one portion of diseased or displaced intestine may compress another, either by its own weight, or by dragging on its mesenteric attachment.

3. **Stricture** is a common cause of obstruction, especially of the rectum and large intestine. This may be, and frequently is, malignant, and dependent on a cancerous growth in the intestinal walls, or it may be simply cicatricial, the result of the healing of dysentric, syphilitic, or other forms of intestinal ulceration. Simple hypertrophic stricture is rare. Obstructing polypoid growths occasionally occur.

Stricture may also depend on chronic peritonitis matting together portions of the intestine and constricting them.

4. Obstruction may be due to **strangulation** or **incarceration** of the intestine, as in herniæ. External hernial protrusions are obvious, and readily recognised, but the strangulation may be *internal*. A portion of intestine may get incarcerated by fibrous bands stretching across it—the result of former peritonitis; or it may get into an accidental or congenital fissure in the omentum or mesentery, or into some natural aperture, as the foramen of Winslow, or one of the openings in the diaphragm. Or strangulation may be caused by the vermiform appendix or a diverticulum from the intestine becoming adherent by its free end, and so forming a kind of ring in which the intestine may be caught.

5. **Positional lesions** of the intestinal walls. Under this heading we must group cases of *intussusception* or *invagination*, as well as those dependent on *twisting*, *rotation*, or a *sudden bend* of the intestine.

6. A **paralytic** or **sub-paralytic** condition of the intestinal walls. This condition is dependent on a variety of causes—as (*a*) local injury, surgical or accidental; (*b*) fatty degeneration of muscular coat of bowel in certain cases of excessive obesity; (*c*) hysteria; (*d*) the degenerative changes of old age; and (*e*) extreme nervous and muscular exhaustion following infective fevers.

It is apparent from this survey of the various causes of intestinal obstruction that a great number of these cases are not amenable to *medicinal* treatment, and that they can only be remedied by surgical interference. If it were possible in every case to, at once, determine with accuracy the cause of the obstruction, we should be able to summon surgical assistance, and by *early* operation many lives would probably be saved. But this is not possible, and in many instances it is only after the failure of such measures as we shall presently describe, to overcome the obstruction, that we are enabled to conclude that the lesion is of such a nature as can only be remedied by surgical operation.

A thorough and systematic examination of every case will, however, usually enable us to arrive at an approximately accurate diagnosis.

We will assume that the possibility of the case being one of acute peritonitis has been considered and eliminated, and that the possible existence of a strangulated external hernia has not been overlooked.

In an old person, or one of middle age, the frequency of obstruction from fæcal accumulation, or from stricture of the rectum, will point to the propriety of an immediate digital examination of the rectum, which would at once detect the existence of a fæcal accumulation or the presence of stricture. The history and previous symptoms of the case would corroborate this conclusion. Obstruction from **fæcal accumulations** is usually preceded by habitual constipation, and the occasional passage of very large motions. Fæcal tumours may often be felt in the course of the colon, and we may find that a like attack has occurred before, and been relieved by free evacuation of fæces. In stricture of the rectum, malignant or otherwise, the previous history would afford abundant evidence in corroboration of the inference from local exploration. Pelvic tumour compressing the rectum would also be detected by careful examination made by the rectum and vagina, together with external manipulation.

If the patient should be a child, and the case be one of intussusception, a rectal examination would also be of value, for if the invaginated mass had made its way into the rectum, as it sometimes does, we should be able to detect its presence there.

Much assistance in diagnosis may be derived from the consideration of the mode of onset of the obstruction, whether acute and sudden, or chronic and gradual; we should also endeavour to determine whether it is situated in the small or large intestine.

Severe and early vomiting, intense pain, scanty urine, and, generally speaking, the acuteness and rapid progress of the case, point to the small intestine

as the seat of the lesion; while less severe pain, less tendency to vomiting, and average flow of urine, also a gradual onset and slower progress of the case, point to the probability of the obstruction being in the large intestine. Evidence on percussion, over the lumbar and epigastric regions, of great distension of the colon would naturally point to the obstruction being in the large intestine, while, on the other hand, evidence of a non-distended and contracted condition of the colon would indicate that the obstruction was in the small intestine, a conclusion which would be strengthened by the presence of much distension and flatulent commotion in the umbilical and hypogastric regions.

If we are satisfied that the obstruction is situated in the small intestine, and if the patient is a young child, we should first think of *intussusception*. This is usually acute, the rare cases of chronic intussusception being commonly observed in young adults. The characteristic symptoms of **intussusception** are sudden and severe, but intermitting, colicky pains, diarrhœa and tenesmus, with mucus and blood in the stools, the detection of a sausage-shaped tumour in the abdomen, increasing in size, and changing its position, and the possibility, occasionally, of feeling the terminal part of the invaginated gut in the rectum.

The diagnosis would be confirmed if we found gangrenous shreds, or a complete cylindrical portion of intestine passed *per anum*.

Obstruction by **gall-stone** is usually situated in the small intestine, between the duodenum and the iliocæcal valve, in the neighbourhood of which it may be arrested. It usually occurs in middle-aged women, and, in favourable circumstances, a correct diagnosis seems possible. It would be founded on the occurrence of the symptoms of obstruction immediately after a severe attack of biliary colic with jaundice, and, probably, with a history of former attacks of obstructive jaundice.

The history of previous attacks of **peritonitis** will lend probability to the existence of adhesions between coils of intestine, or the presence of constriction from bands of adhesion. But these, and many other conditions, such as twisting, strangulation, etc., it is impossible to diagnose with any approach to certainty. The possibility of filling the colon with fluid enemata is another means of distinguishing whether the obstruction is in the small or the large intestine.

Careful physical examination of the abdominal cavity should enable us to detect the existence of any tumour capable of causing obstruction of the intestine by compression.

In considering the **treatment** of cases of intestinal obstruction we shall deal with the simpler ones first.

When the obstruction is ascertained to be caused by the *compression* or *traction* of an abdominal or pelvic tumour, or an enlarged or displaced viscus, our efforts must be directed to the mechanical removal of this pressure or traction. We may be enabled by manipulation and posture to shift the position of a tumour of the abdomen or pelvis and retain it where its pressure will be removed, if not permanently, yet from time to time, so as to admit of the introduction of an enema or the action of a laxative. The pressure of a cyst may be relieved by puncturing it, that of a displaced womb by its replacement. In such cases it will also be necessary to soften any accumulation of fæces above the point of compression by gentle laxatives and by large enemata, the quantity of fluid injected being regulated by the situation of the obstruction. Warm soap and water, with 2 or 3 tablespoonfuls of olive oil added to it, is the best enema to use. If there has been a prolonged retention of fæces so that they have become very hard, and if there is no great urgency in the case, it is often a good plan to inject with a long tube, passed up as far as it will easily go, 4 ounces of olive oil, and to let it

remain for twelve or twenty-four hours, when a large enema of warm soap and water may be given and repeated until all the hard accumulated fæces have been evacuated. A tablespoonful or two of castor oil mixed with a little warm milk may at the same time be given, or 2 or 3 grains of calomel followed by a draught containing 3 or 4 drams of sodium sulphate and ½ an ounce of tincture of senna in 2 ounces of peppermint water. After the bowels have thus been thoroughly relieved it may be desirable to give a daily aperient, so as to keep the motions semi-fluid or soft, and prevent future accumulations. A teaspoonful of a confection consisting of equal parts of the confections of sulphur and senna of the B.P. may answer this purpose; or a daily dose of two or three teaspoonfuls of Carlsbad salts dissolved in half a pint of hot water. The diet, also, should be so arranged as to favour fluidity of the motions.

When the obstruction is due to **impaction of fæces** in the large intestine, the indications for treatment are obvious, and easily fulfilled. Hard fæculent accumulations in the rectum that can be reached by digital exploration may require to be broken down and removed by the finger, aided by a metal scoop or any suitable blunt instrument. The rest of the treatment for these cases and for the accumulations higher up in the large intestine must be conducted much in the same manner as that just described for accumulations from compression. Many, and rapidly-repeated, large enemata, introduced high up by means of a funnel and syphon tube, will be required to get rid of accumulations in the first and second portions of the colon, and the enemata must be retained as long as possible in order to exert the necessary softening effect; they should, therefore, be given in the knee and left shoulder position, with head and shoulders depressed; or the pelvis may be raised on hard pillows or cushions. In this and in all forms of intestinal obstruction the enemata should be given by the medical attendant himself, who will know how best to promote the

ascent and retention of the fluid. Gentle laxatives should be given at the same time by the mouth, as above described.

In **obstruction** from *stricture*, which is usually situated in the rectum or sigmoid flexure of the colon, if the stricture is impassable, which is rarely the case at first, an operation must be resorted to for the relief of the obstruction by making an artificial anus; but if the *stricture* is not complete, and if it can be reached by the finger or a rectal bougie, it may be dilated and the accumulations above it softened by enemata of warm water or warm soap and water with olive oil, or an enema of olive oil alone, at first, as already mentioned, which may be injected by means of a small tube passed through the stricture. At the same time, laxative medicines should be given to soften and make fluid the evacuations, and these should be continued so long as the *stricture* remains.

Simultaneously in all these cases, if much abdominal pain exists, as may be the case from flatulent distension of the intestine, **opium** must be given to relieve the pain, but only *in small quantity*, and just sufficient to relieve the pain and no more: 5 to 10 minims of liquor opii sedativus may be given with a dose of castor oil, and repeated with a second dose if the pain is not relieved. Or a hypodermic injection of $\frac{1}{6}$th of a grain of hydrochloride of morphine, and $\frac{1}{120}$th of a grain of sulphate of atropine may be given, and repeated after three or four hours, if needed.

But in these forms of intestinal obstruction it is exceedingly important to be sparing and careful in the use of opium, and to remember that it is better, when possible, to relieve them without the use of opium at all; for opium tends to paralyse the muscular walls of the intestine, and if given in large and repeated doses, especially in old people, it will do this so effectually that it will be exceedingly difficult to rouse the over-distended and sub-

paralytic intestine to activity, and a fæcal obstruction, especially when situated high up, may be rendered immovable, or, at any rate, very difficult and tedious to remove.

Necessary as the judicious use of opium is in the treatment of most cases of intestinal obstruction, we have seen much harm result from its indiscriminate employment, and we consider the common dogma that "in intestinal obstruction opium is our sheet anchor" mischievous and dangerous, for it leads the young and inexperienced practitioner to give opium largely and indiscriminately in all these cases.

The same objection does not apply in the same degree to **belladonna**, and Mr. Bryant has warmly advocated its use in these cases, applied externally, the extract mixed with glycerine, and given internally, with or without opium.

In all cases, however, of **acute** obstruction, or obstruction attended by *acute* symptoms, suggestive of enteritis or peritonitis, or intestinal spasm, opium should be given, although it must honestly be admitted, seeing that nine out of every ten such cases end fatally, the opium, in the great majority of cases, simply contributes to euthanasia! Dr. Hunter McGuire, referring to the use of opium in these cases, observes: "*To carry it farther than slight narcosis and arrest of the most painful symptoms of obstruction is an abuse of the remedy.* By such abuse the symptoms will be masked, and both patient and practitioner deceived."*

The application of pounded ice to the abdomen in acute strangulation of the small intestine is said to have been attended with good results; it lessens the risk of peritonitis, and has occasionally overcome the obstruction; but warm applications are generally more soothing and grateful to the patient, such as hot flannels or a hot linseed-meal poultice well sprinkled with laudanum.

* Pepper's "System of Practical Medicine," vol. ii., p. 863.

Abdominal taxis has been highly commended as affording a chance of overcoming the obstruction, if applied early, before the strangulation has been fixed by inflammatory adhesion; it has been attempted in the warm bath, or with the patient under chloroform, or while being given large enemata of warm water. It obviously affords a chance, but quite a *blind* chance, and unless applied very gently it may do harm by compromising the success of subsequent operative measures.

Obstruction from a large gall-stone, impacted in the small intestine, has been successfully treated by rest, small doses of opium, and abdominal massage.

The occasional value and usefulness of large injections of warm water, even in acute obstruction situated in the small intestine, is admitted, and no surgical operation should be attempted until this resource has been tried. The water may be introduced by means of the syphon tube and glass funnel, the patient being placed in the knee and left shoulder position, with the head depressed and the buttocks raised. The injection should be made slowly and gradually, so as to allow time for it to pass through the coils of intestine.

Cases of **intussusception** require special consideration. When a definite diagnosis can be made—and in the case of ileo-cæcal and colon invagination it is often possible to reach the lower end of the invaginated bowel by digital examination in the rectum—or when the presence of the peculiar tumour, and the discharge of blood and mucus from the bowel will distinguish this from other forms of obstruction; in such cases, after quieting the patient, and relieving pain by the use of opium (in *small* doses in children), attempts must be made to reduce the invagination mechanically. In order that these may be successful, they must be made early, before time has been allowed for the invaginated portion to become adherent or gangrenous. We should first push back the mass in the rectum with

the fingers, or a sponge sound, the sponge being well oiled, and applied with firm but gentle pressure. By this means we may partially reduce the invagination, and we should then endeavour to complete it by the injection of a considerable quantity of warm water or of air. It is usual to first place the patient under the influence of an anæsthetic, and in a position which will mechanically favour the replacement of the intestine. The air may be injected by means of a Lund's insufflator. Air is better than water in these cases, and success has not unfrequently followed its use. Serious and fatal accidents have, however, also attended this forcible inflation of the intestine with air. It is only applicable to *quite recent* obstruction.

Prolonged warm baths have been found to relieve the pain, and may certainly favour the reduction of internal strangulation.

For the relief of the extreme distension of the intestines by pent-up gases, which cause so much distress in many of these cases, puncture with a fine exploring trocar has been advocated. The trocar should be carefully disinfected by passing it through the flame of a spirit lamp, and then dipping it in carbolic solution, and it should be plunged into such parts of the intestine as appear from percussion to be specially distended and superficial. By removing the accumulated gas we relieve the intra-intestinal pressure, as well as the dyspnœa caused by the meteorism. It must be remembered that the trocar may sometimes pass between the coils of intestine, but this is of no consequence, and when there is great distension it cannot be difficult, with care, to avoid this. This method is, however, condemned by many "because of its blindness and inadequacy."

An important point in the management of these cases is to support the strength of the patient and ward off fatal collapse by the administration of suitable nourishment. When the obstruction is high up and there is much vomiting, it will be necessary to

have recourse to frequent small enemata of unirritating substances. A few ounces of warm peptonised milk or beef-tea, with a small quantity of brandy, will answer the purpose best. A little iced milk or iced coffee and milk may be given by the mouth if agreeable to the patient, and if it does not excite vomiting. When there is stercoraceous vomiting great relief is often afforded by *washing out the stomach* with some antiseptic fluid, such as a saturated solution of boric acid at a temperature of 100 to 105° F.

"In some cases it produces not only relief, but is absolutely curative. Curschmann ranks washing of the stomach next to opium as a palliative and curative agent. Plain water may be used, or a normal saline solution, or mild antiseptic lotions."*

But in most cases of *acute* obstruction, especially when it seems to be in the small intestine, or possibly connected with disease of the vermiform appendix, keeping in mind the great mortality that attends these cases under ordinary medical treatment, we should not hesitate to recommend early recourse to surgical exploration. We would repeat our caution as to the use of opium. This drug, when given in large doses, is apt to cast a delusive calm over the aspect of the case, and to lead to a false sense of security; the fact that nine out of every ten such cases end fatally gives little support to the extreme laudation which this drug has received. When given in large quantities in cases of fæcal impaction, it induces a sub-paralytic condition of the intestine and protracts recovery greatly, and, we believe, tends often to an erroneous diagnosis as to the nature of the obstruction.

It is a good rule in all cases of intestinal obstruction of a doubtful nature, especially when the onset and the symptoms are acute, to seek surgical advice and co-operation early in the case, and to regard opium simply as a temporary calmative. Moreover, in those

* Professor E. Martin, in "Hare's System of Practical Therapeutics" (second edition), vol. iii., p. 492. Philadelphia, 1901.

few cases of acute obstruction which recover without surgical interference, it must always be doubtful whether there has been an actual mechanical constriction of the bowel, and whether they are not simply instances of fæcal impaction. Treves observes, and no doubt with reason: "In not a few instances the previous treatment has compromised the success of any interference by operation. The engorgement of the bowel has been increased by aperients, and the *normal reflexes* have been *impaired* or *annihilated* by *excessive doses* of *opium* and *belladonna*."*

In the **most urgent cases** of acute obstruction, as Treves points out, the chief object of surgical interference is to relieve the "dangerously engorged bowel above the occluded part," and the removal of the *cause of obstruction may*, and indeed in many cases *must*, be postponed.

The engorged bowel is "filled up to the very stomach with a foul and fæculent fluid, by which the patient is being poisoned. The gut is paralysed, the normal reflexes are lost, there is no peristaltic wave to free the many bends and twists which must be undone to secure a free passage, and the patient dies with some pints of the foulest and most putrid matter still lodged in a viscus possessed with an instinct to absorb its contents." It is the complete evacuation of this that is the urgent matter.

"**Enterotomy,**" Treves goes on to say, "may appear to be a somewhat unsurgical procedure, and not a very brilliant or complete operation, but still it can claim results which appear to indicate the direction in which surgical measures should tend."

No anæsthetic should be given in these cases. The abdomen should be opened in the median line below the umbilicus, and an enterotomy performed. "The incision should be as small as possible, just large enough to allow one distended coil to be drawn forward with the finger. There should be no search-

* "Operative Surgery," vol. ii., p. 380.

ing for the cause of the obstruction. Every minute is of consequence. The bowel is rapidly fixed to the parietal wound by a few sutures, which do not penetrate beyond the submucous coat, and the gut may be best evacuated by a large trocar and canula, to the end of which a long indiarubber tube is fixed. The contents of the gut are thus carried away from the wound. A way for the trocar through the outer coats of the intestine must be made with a scalpel. As the bowel is emptying itself, it may be more accurately secured to the margins of the parietal wound by a few more sutures." The stomach should be washed out, either before or after the operation, with hot water containing some boric acid in solution. The pulse is improved and the patient revived by the hot water. In less urgent cases a rapid search may be made for the obstruction; but if this is not quickly found no time must be lost, and the bowel should be immediately opened.

In other cases still less urgent, after washing out the stomach with hot water, an anæsthetic may be cautiously administered; it must not, however, be pushed to complete insensibility. An incision should then be made in the median line between the umbilicus and the pubes *large enough to admit the hand*, and search made for the site of the obstruction. "As soon as the abdomen has been opened three fingers may be introduced, and the cæcum examined." If empty, the obstruction is in the small intestine; if distended, then probably in the colon, and the direction of the further search is determined accordingly.

"After the cause of the obstruction has been found and relieved, it will in very many instances still be wise to evacuate the distended bowel. The opening made may be closed as soon as the gut is considered to have sufficiently emptied itself; but it may with greater safety be left open for the time being, and be closed by subsequent operation."*

* Further precise details will be found in Sir F. Treves' work already mentioned.

An impacted *gall-stone* or enterolith may possibly be broken up or crushed without opening the intestine, but for this purpose it must be moved from the seat of impaction, where the intestine may be inflamed, ulcerated, or gangrenous. It should be moved upwards into the distended and healthier bowel, and dealt with there, either by crushing, or, if this is not practicable, by removal by an incision in the free border of the bowel, and in its long axis. If the gut should be gangrenous at the obstructed part it must be resected, and an artificial anus established.

In cases of *paralytic* distension the passage of the rectal tube is often of much service, especially at the onset of such cases. "It excites peristalsis, and by overcoming the resistance of the sphincter, relieves tension by allowing quantities of gas to escape." In such cases also *saline purgatives* are of great utility.

"Administered in the first stage, before paralysis has fairly developed, they seem to have the power of re-establishing peristalsis, of restoring tone to the muscular coats of the bowel, and of sweeping from the intestinal tracts the partially-digested matter ripe for fermentation and putrefaction. . . Salines, then, should be administered freely in the beginning of this form of obstruction."* They must not, however, be used in advanced cases where vomiting has set in; in such cases the faradic current, full doses of strychnine, lavage of the stomach, brandy *per rectum* or hypodermically, and as a final resort—when death seems imminent from septic absorption or over-distension—we must have recourse to laparotomy and incision of the bowel, and formation of an artificial anus.

In cases of chronic obstruction, when the disease is in the colon or rectum, colotomy, *lumbar* or *iliac*, is usually performed, and an artificial anus established.

For fuller details as to surgical measures we must refer the reader to modern works on operative surgery.

* Professor E. Martin, in "Hare's System of Practical Therapeutics" (second edition). Philadelphia, 1901.

With respect to *diet* in cases of acute obstruction, it is obviously irrational to give food or drink by the mouth; at most a little ice-water may be sipped or fragments of ice sucked. Not only is there no digestion or absorption by the stomach, but any food introduced into it will provoke fresh vomiting, and add to the matter undergoing decomposition in the intestine.

Peptonised foods (milk, beef, eggs) and stimulants must be given *per rectum*. To relieve thirst, Professor E. Martin recommends injecting a pint of normal saline solution into the *lower* bowel every 2 hours. To relieve threatened cardiac failure and collapse, he gives, "by means of a fountain syringe and a fine canula, 3 oz. of whisky, dissolved in 2 pints of warm sterile saline solution, thrown by gravity into the loose cellular tissue of the loins or buttocks. By gentle friction over the seat of injection rapid absorption is obtained."

CHAPTER XIII.

DISEASES OF THE INTESTINES—THE TREATMENT OF INTESTINAL PARASITES.

Parasitic Worms peculiar to Man — *Tapeworms:* Symptoms — Diagnosis. *Treatment*—Preparatory—Vermicidal—Filix Mas —Kousso—Pomegranate—Pelletierine—Turpentine—Kamala —Pumpkin Seeds—Thymol, Chloroform, etc. *Lumbrici*, or *Round Worms:* Symptoms—*Treatment*—Santonin—Kamala. *Oxyuris vermicularis*, or *Threadworm:* Causes—Symptoms—*Treatment* — Difficulties — Enemata — Suppositories—Purgatives—Tonics. *Trichocephalus dispar—Anchylostomum duodenale.* Additional Formulæ.

THE successful treatment of intestinal parasites depends on its adaptation to the different species, and requires a knowledge of the habits and mode of development of each kind. Prophylaxis also must be founded on a thorough knowledge of their natural history. Cleanliness and care in personal habits, and in the selection and preparation of food and drink, will, however, certainly protect us from many species. All animal food should be sufficiently cooked, all suspected water carefully filtered, and more care should be observed in our association with domestic animals.

The seven kinds of parasitic worms *peculiar* to man chiefly concern us here. Three of these belong to the *tapeworm* class, viz. :—

Tænia solium, Tænia mediocanellata, or saginata, and Bothriocephalus latus.

Four to the class of *round worms*, viz. :—

Ascaris lumbricoides, Oxyuris vermicularis, Trichocephalus dispar, and Anchylostomum duodenale.

Tapeworms.—The mature tapeworm as it is found in the intestinal canal of man and other animals is a soft, flat, white, tape-like-looking worm, having a small head furnished with suckers, and a circlet of hooks, by which it clings to the mucous membrane.

A slender neck succeeds the head, and gradually widens into the body, which is composed of segments (called proglottides) which become larger and larger the farther they are from the neck, until they acquire their full size, when they become detached, singly, or several linked together. The worm has neither mouth nor intestinal canal, but derives its food by imbibition from the intestinal juices in which it lies. The mature segments consist almost wholly of sexual organs of both kinds, and are, therefore, self-impregnating. In the eggs contained in these segments a six-hooked embryo is developed. These eggs when discharged from the intestinal canal, either free or enclosed in the proglottis, for the most part perish, but if they become swallowed by animals, as they sometimes do, then the six-hooked embryo is set free, and by some means or other migrates from the digestive canal into the liver, muscles, or other organs of the animal. In favourable circumstances it there assumes its scolex or larval form. This usually consists of a cyst, with an inverted head and neck resembling that of the parent tapeworm. Now, if the flesh of animals containing these scolices, in an active state, be eaten by another animal, the scolices may be set free by stomach digestion, and passing into the small intestine, the head of the scolex becomes everted, and fastens on to the intestinal mucous membrane, the cyst disappears, and by successive budding another tapeworm colony becomes developed. This brief account of the life history of a tapeworm is sufficient for our present purpose. For a tapeworm to be developed it is only necessary that a living embryo be introduced into the stomach, and this is usually done by eating animal flesh containing them, either raw, or cooked insufficiently to kill or arrest the further development of the embryo.

Tænia solium * usually arises from eating

* The *Tænia solium* in its embryonic state is known as the *Cysticercus cellulosæ*, and dwells in the intermuscular connective tissue and other parts of the pig.

imperfectly cooked pork, and *Tænia saginata* from the flesh of the ox. Children are said to have acquired the latter from eating grated raw-beef given them by medical prescription. *Tænia solium* is only found in the human small intestine, usually in its upper third, into the mucous membrane of which the head is very firmly fixed, the neck and the first segment of the worm lying coiled up in a mass around the head. The worm may reach to the lower third of the small intestine, but rarely to the cæcum. *T. saginata*, also peculiar to man, differs from *T. solium* in its head not having a circlet of hooks, in place of which it has a small frontal sucker besides the four powerful sucking discs on its head, which is far larger than that of *T. solium*. It is a much larger, stronger, thicker, and fatter worm, and may grow to a length of nearly 20 yards.

The only other tapeworm frequently found in man is the *Bothriocephalus latus*. It is not, however, like the two preceding, peculiar to the human being, as it has often been met with in dogs. It is the longest of all the tapeworms that inhabit the intestine of man, and may reach 25 yards in length. The head differs in form from that of either of the preceding. It is almond-shaped, and has a long elliptical sucker on each side. It has a dull bluish-grey colour when fresh. It differs further from *T. solium* or *T. saginata* by having its genital orifice in the centre of the brood surface of the segments, not on the margin, and this is always on the same ventral aspect. The uterus, distended with eggs, appears in the mature segments, which are nearly square, or *as broad as they are long*, as a *central* rosette-like group of pouches (Fig. 9).

The eggs, *if left in water* for some months, develop within them a six-hooked embryo. They open by casting off a lid, and then the embryo swims about by means of a ciliated envelope, which is thrown off after four to six days, retaining still a transparent albuminous coat. Its further fate is unknown, but it is thought highly probable that its intermediate state

of development takes place in some aquatic animal. Lately the scolices have been found by Braun, of St. Petersburg, in the muscles, liver, and organs of generation of the pike, trout, and eel-pout, and by causing cats and dogs to feed on these the fully developed tapeworm has been produced. It would, therefore, seem probable that man might be infected by eating such fish raw or insufficiently cooked. This tapeworm has not been found except in Europe, and it is especially frequent in Western Switzerland, and in Poland, parts of Sweden, Finland, St. Petersburg, and the Baltic Provinces.

The **symptoms** due to the presence of one or more tapeworms in the intestinal canal may be so insignificant as to escape notice, especially in the case of children, and their existence may not be suspected until its segments are discovered in the motions. In many cases, however, troublesome symptoms due to the presence of the worm in the small intestine make themselves manifest. Vague digestive and nutritive disturbances, unpleasant feelings in the abdomen, sometimes colicky pains are complained of, most troublesome during fasting, or after particular articles of diet. These are relieved by eating, and especially by certain kinds of food. Sensations of ravenous hunger, feelings of fainting, a sense of distension in the abdomen, diarrhœa alternating with constipation, a feeling as if some foreign body were moving about in the intestines—all these have been complained of in connection with tapeworm. The following reflex phenomena have also been noticed:—Itching about the anus, tickling of the nose, salivation, vomiting, headaches, singing in the ears, palpitation, gastralgia, and many convulsive nervous affections, such as chorea, cramp, etc.

So far as diagnosis is concerned, it is commonly by the observation of segments of the worm in the motions that we conclude a patient has tapeworm. If, however, we have not had an opportunity ourselves of seeing any of these segments, a mild purgative will

usually bring away some, if a tapeworm really exists in the small intestine. It must be remembered that it is not uncommon for patients who pass large shreds and strings of tough mucus owing to chronic catarrh

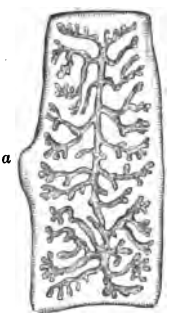


Fig. 7.—Ripe Segment of *Tænia solium*.

a, Genital pore. (Magnified 6 diam.)

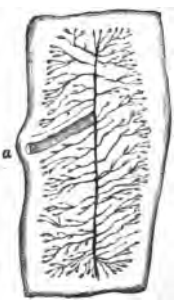


Fig. 8.—Ripe Segment of *Tænia saginata*.

a, Genital pore. (Magnified 6 diam.)



Fig. 9.—Ripe Segment of *Bothriocephalus latus*. (Magnified 6 diam.)

of the large intestine to regard these as portions of tapeworm.

As *Tænia saginata* is said to be much more difficult to expel than either *Tænia solium* or *Bothriocephalus latus*, it is desirable, before beginning the treatment, that we should ascertain which kind we have to deal with. The segments of *Tænia saginata* (Figs. 8, 10, A) are much stronger, thicker, and more opaque than those of *Tænia solium* (Figs. 7, 10, D). If we spread out some of the segments on a glass plate, and allow them to dry, we can distinguish the smaller number of lateral branches going off from the uterus

in the *T. solium*, from the numerous lateral branches —from 15 to 20—in the segments of *T. saginata.*

The ripe segments of *Bothriocephalus latus* are almost square, and the uterus in the centre is seen in the form of a brown rosette (Fig. 9).

The heads of these three kinds are also here figured (Fig. 10) :—

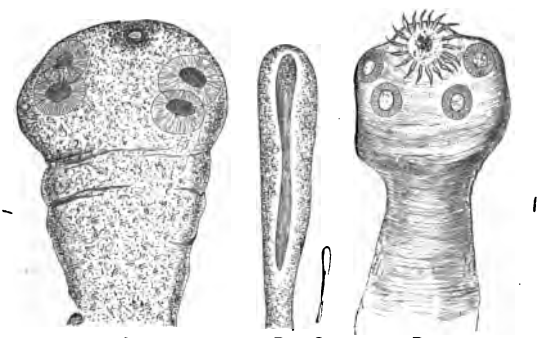


Fig. 10.—A, Head of *Tænia saginata.* B, Head of *Bothriocephalus latus*, seen from the side (magnified). C, The same seen from above (natural size). D, Enlarged Head of *Tænia solium.*

A cure can only be said to be radical when the head is found in the evacuations, or if more than one worm exist, the head of each.

Occasionally the whole worm is expelled in one piece, as a densely-coiled mass, and the head will be found by tracing the segments, from larger to smaller, until at last we find the smallest segments terminating in the slender neck and broader head of the worm. More frequently we find the smaller segments broken, and then the evacuation must be washed several times with water, by pouring clean water upon it again and again, allowing it to stand each time for 10 minutes, and then pouring it off till it is scarcely coloured. Then we should transfer the worm, coil by coil, to a vessel of clean water, and search for the head amongst the residuum of single segments and smaller

fragments. If the head is not seen, it is to be feared it remains, not dislodged, in the small intestine. We must then wait for three months (the worm requires eight to ten weeks to arrive at maturity), and see if any fresh segments are expelled. If no segments have been expelled, we may conclude that the head was discharged, although not found, and that the cure is complete.

After taking a vermicide and vermifuge dose, it is a good plan to direct the patient to pass his evacuations into a vessel three parts full of warm water; this will greatly facilitate the search for the head of the worm.

Before administering the remedy by which we hope to procure the expulsion of the worm, some **preparatory treatment** is advisable in order to give the remedy the best chance of success. It is obviously desirable to clear away from the intestine, as much as possible, all the solid fæculent matter that may be present there, so that the remedial agent shall come in contact with the worm, diluted only with the fluid secretions of the intestine. We may also hope that the worm when detached will thus be expelled more quickly, and as we should have only fluid evacuations to examine, we should have less difficulty in discovering the head in them than in a mixture of solid and fluid excrement. We should therefore administer gentle laxatives for two or three days as a preparatory measure; not strong purgatives, which break the worm, and cause portions of it to come away, so that what remains may be more difficult to dislodge.

We may give from 1 to 2 drams of sodium sulphate with 1 or 2 drams of syrup of senna in $1\frac{1}{2}$ ounce of cinnamon water each morning fasting, and an enema of soap and water each night. The food during these two or three days should be mostly fluid and concentrated, not leaving much undigested residue, such as the lean of meat, meat broths and soups, with bread crumb, fruit jellies, milk diluted with water, tea, coffee, wine and water, or mild beer.

The patient's bowels having been completely evacuated the evening or day before, and no solid food taken afterwards, on or soon after waking the next morning the vermicide medicine should be given. The following are the drugs that have been found most successful in getting rid of *Tœnia*:—

Male fern (filix mas); *Kousso, or Cusso* (the dried panicles of Brayera anthelmintica); *Pomegranate* (the dried bark of the root of Punica granatum); *Pelletierine* sulphate and tannate (an alkaloid obtained from pomegranate); *Kamala; Turpentine; Pumpkin seeds* (the seeds of the Cucurbita pepo); *Thymol.*

The **filix mas**, or male fern, is an efficient Tæniacide. It has been said to be more poisonous to the *Bothriocephalus* than to the *Tœniæ*. The liquid extract is usually used, and it is important that it should be as freshly made, from the fresh root, as possible.

It may be given in capsules, each containing 15 minims. A capsule should be given every quarter of an hour until four to six have been taken. They may be washed down with a little *café au lait*; or the extract may be made into an emulsion by rubbing down 60 to 90 minims with half a dram of compound tragacanth powder, and slowly adding 2 ounces of peppermint water. One-third of this draught should be taken every quarter of an hour.

Or the liquid extract may be made into a confection by rubbing up 60 to 90 minims with 4 drams of powdered male fern root, and a sufficient quantity of honey. A sixth part should be taken every quarter of an hour.

If, after two hours, no aperient action has followed these doses, a purgative should be given—a tablespoonful of castor oil is the best, which may be repeated in half an hour if necessary. A smaller dose of the male fern extract may be given to children, but we believe that when it fails to bring away the whole of the worm it is often because an insufficient dose has been given.

Some prefer to combine an aperient with the oil of male fern, and for this purpose capsules are made, each containing 7½ minims of extract of male fern and a grain of calomel. Sixteen of these are taken for a dose, two every 10 minutes.

Bamberger * is reported to order the large dose of 5 drams of the fresh ethereal extract, with an equal quantity of castor oil at one dose!

Kousso, or Cusso, an ancient Abyssinian remedy, has been warmly advocated by Heller, and it is, no doubt, an efficacious vermicide. An infusion may be made of the flowers, in coarse powder, 2 to 4 drams in 4 ounces of hot water, allowed to stand for 15 minutes; but the compressed drug enclosed in gelatine capsules is said to act better. If the infusion is used it should not be strained from the herb, but the whole should be swallowed. It should be followed in less than two hours by a purgative. It is a very unpleasant drug to take, and not unfrequently causes nausea and vomiting; it is also costly, hence it is not largely used in England.

Heller states that 5 drams are needed for expelling the *Tænia solium* and 7½ drams for the *Tænia saginata.*

Prof. Widerhofer † makes an electuary by mixing 2½ drams of powdered kousso with 6 drams of honey, and gives this in two doses; and Bamberger occasionally combines kousso with male fern, mixing 75 minims of extract of male fern with 2½ drams of powdered kousso, enclosing this in 30 capsules, and giving four every quarter of an hour.

Koussin, an alcoholic extract from kousso, has been found successful in doses of 30 grains, and it has the advantage of not exciting nausea.

Pomegranate.—The bark of the root of Punica granatum has been highly extolled by Küchen-

* "Formulaire de la Faculté de Médecine de Vienne," by Dr. T. Wiethe, 1888, p. 91.

† "Formulaire de la Faculté de Médecine de Vienne."

meister. He directs that 3 ounces of the fresh bark should be macerated in 12 ounces of water for twelve hours, and the infusion concentrated to one-half. It must be taken within an hour in three or four doses, and if no purgative effect follows in an hour or two, a dose of castor oil must be given. There is a decoction in the B.P., the dose of which is $\frac{1}{2}$ to 2 ounces.

It has been objected to this drug that it causes much abdominal discomfort, together with nausea and vomiting, and of late years an alkaloid derived from the bark of the pomegranate root—the **tannate of pelletierine**—has been used in its stead. This is a yellowish white powder, insoluble, or almost so, in water, and is on that account better suited for a vermicide than the sulphate, which is soluble in water and, therefore, more likely to be partly absorbed in the stomach. The dose is 5 to 8 grains, given fasting, mixed with a little water. A tumblerful of water should be drunk 10 minutes afterwards, and half an hour later an aperient should be given—either a tablespoonful or two of castor oil or 1 or 2 ounces of infusion of senna. This has proved a most efficacious poison to the tapeworm; but it is questionable whether it may not produce toxic effects in children.

Turpentine has been found an efficient remedy for tapeworm. It must be given in a large dose, and is best combined with an equal quantity of castor oil so as to insure its being carried quickly through the bowel, and not absorbed into the circulation, in which case it would be likely to give rise to troublesome renal irritation.

The mixture usually ordered consists of 1 ounce of oil of turpentine and 1 ounce of castor oil made into an emulsion with yolk of egg; but this is very disagreeable to take, and if we select turpentine as a tæniacide, it is best to get an ounce each of turpentine and castor oil mixed and enclosed in about 30 gelatine capsules. These may be swallowed

one after the other in a few minutes, the patient washing them down with mouthfuls of warm milk and water. If this dose be taken fasting it will usually act quickly as a purge, and bring away the dead worm.

Kamala.—This is an orange-red powder, probably of a resinous nature, and consisting of the glands and hairs from the capsules of a euphorbiaceous plant. It is quite insoluble in water. It should be administered in doses of 30 to 100 grains, according to the age and vigour of the patient, and usually two doses are given at an interval of half an hour. It may be made into a confection with honey, or it may be suspended in gruel or chocolate. An aperient should be given within two hours. It is usually efficacious in expelling the worm.

Davaine prefers the **tincture** made by macerating 1 part of kamala with 2 of rectified spirit for two days, and filtering. (The B. P. tincture is 1 in 5.) A dram of this with a dram of syrup of orange-peel and an ounce of cinnamon water should be given every hour for four doses, and if the worm is not expelled within two hours of the last dose, an ounce of castor oil should be given.

Pumpkin seeds have been found a mild and useful tæniacide for children, and not unpleasant to take. Their efficacy appears to depend on the presence of a resin in the perisperm, to which the name *peporesine* has been given. About an ounce of the seeds may be given a child for a dose, and they may be pounded up with sugar and honey into a paste, which children will readily eat.

Thymol.—This drug has recently been stated to be efficacious in the destruction of tapeworm.

The advantage is claimed for it over most of the other remedies that it does not cause any gastric or intestinal disturbance; that it both kills and expels the worm; that, compared with other remedies, its administration is rapid and simple. It is admitted, however, that, given in doses sufficient for the purpose

in view, it produces a certain amount of depression, the pulse becomes more frequent and more feeble, the respirations and the temperature are lowered; it is, therefore, necessary to accompany its administration with some stimulant such as brandy or whisky.

Dr. Numa Campi has given it in the following manner:—In the morning an ounce of castor oil, and then during the day 10 grains of thymol every quarter of an hour, and twenty minutes after the last dose again an ounce of castor oil. A few minutes afterwards a *tænia medio-cannelata* was expelled entire. We are disposed to consider these doses large, and we should prefer in trying this drug, which is somewhat caustic, to give not more than 3 to 5 grains for a dose and we should make this into pills with a little powdered soap and spirit. Two pills, with 2½ grains in each, might be given every 20 minutes with a wineglassful of warm milk and water and a dessertspoonful of brandy. The patient should, of course, take nothing in the way of food during the time he is taking the thymol. Other antiseptic substances have been used to kill tænia, and, it is stated, with success—*e.g. naphthaline*, in doses varying from 2 to 20 grains, mixed with powdered sugar, twice a day; and *creolin*, 15 grains in a capsule three times a day.

The following has been stated to be an efficacious tæniafuge:—

℞ Olei crotonis gutta j.
Chloroformi ʒj.
Glycerini ʒx.

Misce, fiat mistura. Half to be taken fasting, and repeated in half an hour. Abstinence from food the evening before.

Chloroform in 15 or 20-minim doses, mixed with simple syrup, has also been said to prove efficacious in getting rid of tapeworm. A dose is given every two hours, and subsequently a dose of castor oil. If it escaped complete volatilisation in the stomach and reached the small intestine, it might intoxicate the worm, and so detach the head.

It must be borne in mind, in administering drugs for tapeworm, that the object is to poison and kill or paralyse the worm, so that it may relax its hold on the intestinal walls, without *poisoning* the patient; and those remedies, therefore, which are insoluble or very slightly soluble in water are best suited to our purpose.

Infusions and decoctions which may be largely absorbed in the stomach are objectionable, for two reasons—first, the absorbed substances may produce disagreeable toxic effects on the patient; and, second, if a portion is absorbed in the stomach it fails to reach the worm in the small intestine. Hence we see nearly all the successful tæniacides are either oils, or resins, or oleo-resins. The **prophylaxis** consists in scrupulous cleanliness and care in the preparation of food, which should be completely cooked, raw and underdone meats being avoided. And in association with domestic animals great care should be observed.

Ascaris lumbricoides.—The *lumbricus*, or round worm, inhabits the small intestine, but wanders sometimes to other parts. It is cylindrical, usually of a light brownish or dirty white colour, and tapers at each end. The female is usually from 6 to 12 inches long, the male is smaller. Five or six are often found together, and occasionally a much larger number. The mature female produces an enormous number of eggs, which are discharged in the evacuations. These eggs have great power of resisting destructive agencies, and probably retain for years the capacity of development. We have no certain knowledge of the complete life history of this parasitic worm, or how man becomes infected; but it seems most likely that the eggs gain entrance to the human intestine in contaminated drinking water. It is much more common amongst the poor and uncivilised than amongst the better and more civilised classes, who are trained to habits of cleanliness, and whose food is more carefully selected and prepared. It is also far more common in children than adults.

The presence of this worm in the intestine is usually discovered by the appearance of one in the motions, or they may wander into the stomach and be vomited, or occasionally they have appeared at the nostrils. Children are, however, often suspected of having worms when they present certain symptoms that are otherwise difficult to account for, such as itching at the nose, capricious appetite, foul breath, colicky pains, with swelling of the abdomen, emaciation, nocturnal restlessness, bad dreams, and grating of the teeth in sleep. Convulsions and epilepsy have been occasionally caused by them.

The **treatment** of these worms is simple. The best vermicide for them is *santonica*, the unexpanded flower-heads of *artemisia maritima*, or its active principle **santonin.** It kills them speedily and certainly. The drug must, however, be used with great caution in very young children and infants, as it has been known to cause toxic symptoms which have even proved fatal, viz. purging and vomiting, with convulsions and coma. *Santonin* is very sparingly soluble in water, and is often given in lozenges (B.P.), each containing 1 grain. The dose is 2 to 3 grains given fasting or after a mild purge, and in combination with some aperient such as castor oil. Professor Heller objects to castor oil as a medium for the drug, as, he says, it has the property of dissolving santonin, and, therefore, promoting its absorption and the production of toxic effects. Küchenmeister, however, maintains that it acts better when given with castor oil than in any other way, and Professor Whitla confirms this observation, "after seeing its administration in some thousands of instances in the practice of a children's hospital. Unpleasant symptoms were never observed, though the drug was given in full doses; *the oil appears* to lessen very considerably the risk of any evil effects." He gave 2-grain doses to children two years old at bed-time, mixed with a large teaspoonful of castor oil, and more oil in the morning if necessary. If castor oil is objected to

the drug can be given mixed with 2 or 3 grains of calomel and a little powdered sugar. Or lozenges may be made, each containing 1 grain of calomel and 1 grain of santonin, two or three of which would be a dose. For older children from five to ten years of age the following mixture may be prescribed :—

℞ Santonini gr. vj.
Olei ricini ʒiv.
Syrupi aurantii ʒiij.
Mucilaginis acaciæ ʒvj.
Aquæ carui ad ℥iij.
Misce, fiat mistura. Take half in the morning fasting.

One of the bye-effects of santonin, coming on shortly after the dose is given, is yellow vision, and the urine is often stained yellow or orange. **Kamala** also is efficacious in the cure of lumbrici.

Dr. H. H. Hare says,* "The careful physician will also see that the patient receives, immediately after the action of the purgative medicine, a copious rectal injection of salt-water, in order that the bowel may be thoroughly washed out, and in this liquid, when it is expelled from the bowel, there will be found quite frequently additional worms to those freely passed. . . . The head of a tapeworm will perhaps be washed out of the bowel by this means."

Oxyuris vermicularis, or **threadworm.**—This is a small, white, round worm, tapering at each end. The female, which is longer than the male, is about $\frac{2}{5}$ inch long, the male only one-third or half that length. The posterior extremity of the female is drawn out into a fine-pointed tail, that of the male is blunt and curved upward.

This worm, from the egg to maturity, spends its whole life in the human intestine. It is only found in the human intestine from the jejunum to the anus. It is an error to suppose, as has often been stated, that this worm specially inhabits the rectum. The young animals and the mature males chiefly inhabit the small intestine; the impregnated and mature

* Hare's "System of Practical Therapeutics" (second edition), vol. ii., p. 491.

females the *cæcum.* In the *cæcum* they are most abundant, and the females gradually collect together there until mature, and crammed with eggs. They are prone to collect in the *vermiform appendix.* Heller has seen with the naked eye as many as nineteen females and nineteen males in the appendix. They then pass slowly down the large intestine, and finally deposit the chief part of their eggs in the rectum. They sometimes even crawl out on the moist skin around the anus. Finally, both males and females are mechanically expelled with the fæces, and perish. It is generally believed that the ripe eggs must be swallowed, and their shells acted upon by the gastric juice of the stomach, in order that the embryo may be set free so as to affect the human intestine. But certainly one observer has seen the embryos escaping from the eggs in mucus taken from the rectum.* But this is regarded as a very exceptional circumstance, and in general the embryos are first set free in the stomach, and at once pass into the upper part of the small intestine. They arrive quickly at maturity. Young worms have been expelled fourteen days after swallowing the eggs. They are often excessively numerous, covering the whole mucous membrane of the intestine.

As to the **cause** of the presence of this worm in the intestine, it must be concluded that the ripe eggs are always swallowed, and that it is a consequence of want of care and cleanliness. Scrupulous cleanliness is needed to prevent self-infection. As the eggs soon perish in water, it is not likely that they are introduced in drinking water, but it has been suggested that, under favourable conditions, they may be transmitted in the dust of the atmosphere. They occur at all ages, but are more common during childhood.

The particular and characteristic symptom this worm gives rise to is irritation of the lower part of the rectum just within the sphincter. The worms descend to this part to lay their eggs, and their active boring

* Vix, quoted in Von Ziemssen's "Cyclopædia," vol. xii., p. 755.

movements cause an intense tickling and itching almost intolerable. This is especially noticed at night in bed. In *females*, the worms that have escaped from the rectum may creep between the vulva and into the vagina, or may be carried there by the hands in scratching, and there by their wriggling, boring movements they set up great irritation of the sexual organs, and may lead to masturbation. By exciting sympathetic irritation of the generative organs they have been known to cause troublesome erections, nymphomania, pruritus, etc.

The successful **treatment** and complete dislodgment of this parasite is often difficult; for not only have the worms to be dislodged from the rectum, which is not very difficult, but they have to be destroyed in their favourite abiding place, the cæcum, and in the appendix vermiformis.

To dislodge them from the rectum the best plan is to administer daily an injection which shall wash away the worms and their eggs, together with the mucus in which they are imbedded. Various substances have been recommended to be used for these enemata—as decoction of quassia (made by boiling an ounce of quassia chips in a pint and a half of water down to a pint and straining; an effectual remedy), decoction of eucalyptus, lime water; salt and water (two teaspoonfuls to a pint of water, improved by the addition of half a teaspoonful of bicarbonate of soda); natural sulphur water; glycerine and water (equal parts). Heller prefers an enema of soap and water, 2 or 3 grains of castile soap to each ounce of distilled or rain water. This is without any unpleasant action on the intestinal mucous membrane, while it quickly destroys both worms and eggs. He recommends the adoption of Hegar's method of washing out the whole length of the large intestine by means of a long flexible tube and a syphon arrangement, the patient being placed on his hands and knees. After the bowel has been freed from fæces, in the adult (for whom alone this

treatment is practicable) the bowel may be washed out with large quantities of soap and water—as much as can be tolerated without exciting persistent straining efforts—from 3 to 6 pints, introduced slowly. This method is only necessary in very troublesome cases.

Excellent results have been said to be obtained by enemata of naphthaline (15 to 20 grains) in olive oil (1½ to 2 ounces) in young children. Larger doses must be employed for adults, and in this case a turpentine enema, 1 dram to a pint of soap and water, is very useful.

Injections of cod-liver oil, pure, or made into an emulsion with yolk of egg, have also been found useful, and they have the advantage of being non-irritating.

The introduction into the rectum of mercurial ointment, diluted with vaseline, which can be passed in with the finger or on a small piece of sponge, or a **mercurial suppository**, is a good plan in cases where the employment of enemata is difficult. The white precipitate ointment should also be applied freely to the external parts to destroy ova or wandering parasites. If there is much local irritation still unrelieved, the anus and the mucous membrane just inside it may be brushed with a 4 per cent. solution of hydrochloride of cocaine.

Dr. Archambault, when he finds enemata of 4 to 6 ounces of lime water fail, uses solutions of perchloride of iron (5 per cent.) every night for five to ten nights, or a small lavement (3 ounces) containing ¼ grain of corrosive sublimate.

Suppositories of *tannin*, and of extract of *quassia* mixed with cacao butter, have been well spoken of.

With regard to internal remedies, the free administration of **purgatives** is, no doubt, very useful; they mechanically sweep away the parasites. In adults we may give a combination of the sulphates of magnesia and soda, a teaspoonful of each dissolved in a tumblerful of cold water, early in the morning,

repeating the dose every hour until free purgation is established. In children a combination of calomel, jalap, and scammony answers well, such as the following, given at bed-time or in the early morning :—

℞ Hydrargyri subchloridi, gr. ij.
Pulveris scammonii compositi, gr. x. ad gr. xx.
(according to age).
Or two grains of calomel may be given, with 10 to 30 grains of confection of scammony, at the same hour.

Or the effect of **sulphur** may be tried as an aperient, and this, being insoluble, will certainly come in contact with the worms in the cæcum. Half or a whole teaspoonful of the confection of sulphur should be given every night, and an ounce of the compound senna mixture (B.P.) the following morning. By means of purgatives internally, and diligently washing out the rectum with enemata, these parasites can be kept under, and if no reinfection takes place they may in course of time be got rid of.

Dr. Sydney Martin has had good results from the use of rhubarb in small doses, and the worms have been so freely expelled that there has been no need of injections. He gives the following dose three or four times a day :—

℞ Tincturæ rhei		♏ jss.
Magnesii carbonatis		gr. iij.
Tincturæ zingiberis		♏ ss.
Aquæ		ad ʒj.

Misce, fiat dosis.

The regular use of **tonics** of vegetable bitters and iron will further this result, and so will the use of cod-liver oil, in thin and strumous children. Twenty or 30 minims of the syrup of the phosphate of iron in two teaspoonfuls of infusion of calumba may be given to children one hour after food three times a day, or half a teaspoonful of vinum ferri citratis to quite young infants, or a grain or two of reduced iron in a powder with sugar.

In adults we have found the continued use of the

following pill useful in preventing the reappearance of the parasite :—

℞ Ferri sulphatis exsiccatæ gr. j.
Quassiæ pulveris gr. ij.
Saponis gr. j.

Misce, fiat pilula. Two or three to be taken thrice daily an hour after food.

The ordinary vermicides seem to have little effect on these parasites, partly because some of these are absorbed before they reach the cæcum, and partly because these worms seem to be able to resist the action of such agents. Heller states that he has found them *quite lively* under a dressing applied for venereal disease consisting of a fairly strong solution of carbolic acid.

The *prophylactic* measures are too obvious to need mention.

The **trichocephalus dispar,** or long thread-worm, which also is found inhabiting the cæcum of man, is rarely seen in England. It is attended by no special symptoms, and is not amenable to any particular treatment.

The **anchylostomum duodenale,** which is very prevalent in Egypt and in most tropical countries, is not known in the north of Europe, nor have any definite rules for its treatment been established. Federici has, however, stated that *thymol* acted successfully in killing the parasites in some cases which occurred among the miners of the St. Gothard Tunnel; its use is also recommended by Manson.* As much as 30 grains have been given in a cachet early in the morning and repeated after two hours, followed in another two hours by a purge.

Dr. MacDonald, of Colombo, we are informed, treats this disease by giving 30 grains of thymol, with 30 grains of sagar, in the early morning, having given a senna purge the night before; eighteen hours afterwards a dose of castor oil is given. This treatment is repeated after four to eight days.

* "Tropical Diseases," p. 591 (new edition), 1900.

ADDITIONAL FORMULÆ.

For tapeworm.

℞ Radicis corticis granati, ℥jss ad ℥ijss.
Macerate for twenty-four hours, then boil in—
Aquæ destillatæ, ℥xij.
Evaporate to 6 oz. and add—
Extracti filicis maris æther., ℥ij.
A third part to be taken (fasting) every half hour. Take a saline aperient the night before, and no food other than soup or tea or a salt herring! (*Bamberger.*)

Another.

℞ Kousso pulveris, ℥v.
Infuse in boiling water (half a pint) for a quarter of an hour, strain, and add half a teaspoonful of lemon juice. To be taken fasting. (*Bamberger.*)
It will be necessary to give one or two tablespoonfuls of castor oil if the vermicide does not act as an aperient.

Another.

℞ Extracti filicis maris æther., gr. xxx.
Pulveris radicis filicis maris, gr. xxx.
Confectionis rosæ, quantum sufficiat
ut f. pil. x. From two to four pills every half hour. (*Bamberger.*)

For children.

℞ Kousso pulveris, ℥ij.
Extracti filicis maris æther., ℥j.
Enclose in twenty-four gelatine capsules. Four to be taken every quarter of an hour. (*Bamberger.*)

Draught for tapeworm.

℞ Extracti filicis liquidi, ℥j.
Ovi vitellum, ℥j.
Aquæ chloroformi et syrupi simplicis, q.s. ad ℥ij.
M. f. haust. To be taken in the morning. (*Whitla.*)

Black oxide of copper for tapeworm.

Black oxide of copper, 90 grains.
Prepared chalk, 30 grains.
Kaolin, 180 grains.
Glycerin, q.s.
M. divide into 120 pills. Two to be taken four times a day for a week, and three pills four times a day for a second week. Then a good dose of castor oil. (Acids must be avoided during this treatment.) Strongly advocated by *Sass.*

Confection for children.

℞ Pulveris kamalæ, ℥v.
Extracti filicis maris æther., ℥ijss.
Syrupi aurantii } ää q.s.
Pulveris acaciæ }
Ut f. electuarium. To be given in cachets. (*Monti.*)

Pills for children.

℞ Extracti radicis granati recentis, gr. xl.
Extracti filicis maris, gr. xl.
Pulveris radicis granati, gr. viij.
Ut f. pil. xl. Half an hour after giving the child a cup of milk, give ten of these pills every half-hour, keeping ten in reserve in case some of the others should be vomited. A few hours afterwards a dose of castor oil. (*Fleischmann.*)

Jelly for children.

℞ Extracti filicis maris liquidi, ℥j.
Hydrargyri subchloridi, gr. vj.
Sacchari albi, ℥ij.
Gelatin, q.s.
Ut f. electuarium. Quarter of this may be given every half-hour. (*Duchesne.*)

For lumbrici.

℞ Santonini, gr. viij.
Extracti spigeliæ fluidi, ʒvj.
Extracti sennæ fluidi, ʒij.
M. A teaspoonful for a dose for a child of five years.
(*Prof. Lewis Smith.*)

Enema for ascarides.

℞ Aloes barbadensis, ʒss.
Potassii carbonatis, gr. xv.
Decocti amyli, ℥x.
M. f. enema. (*Guichon.*)

Powder for lumbrici.

℞ Santonini, gr. jss.
Hydrargyri subchloridi, gr. ij.
Sacchari lactis, gr. xv.
M. f. pulv. To be given in honey to an infant two years old.

Enema for ascarides.

℞ Liquoris calcis, ℥iv.
Decocti althææ, ℥j.
M. f. enema. (*Barthez.*)

Another.

℞ Ol. caj̆uputi, ♏xx.
Magnesiæ levis, gr. x.
Mucilaginis amyli, ℥iv.
M. f. enema.

CHAPTER XIV.

DISEASES OF THE INTESTINES—THE TREATMENT OF PERITONITIS.

ACUTE PERITONITIS usually Secondary to Traumatic Lesions or Visceral Diseases—Sometimes Local and Partial. *Symptoms* of Acute General Peritonitis. *Treatment:* Blood-letting—Leeches—Cold Applications—Opium—Rest—Mode of Feeding—Nutrient Enemata, etc.—Treatment of Vomiting and Tympanites—Puncturing the Intestine—Quinine—Influence of Opium—Caution to be observed in its Use—Large Doses in Puerperal Cases—Reaction against its Indiscriminate Use, and Advocacy of Saline Aperients in Early Stage of Disease—Enemata of Warm Water—Calomel. *Surgical* Treatment. TUBERCULAR PERITONITIS—Tabes Mesenterica—Latency and Obscurity of Peritoneal Tubercle. *Symptoms:* Ascites—Sacculated Exudation. *Treatment:* Spontaneous Cure—Local Applications—Iodine—Mercury—Cod-liver Oil and Iodoform—*Laparotomy*, when advisable. Additional Formulæ.

Acute peritonitis may be primitive or secondary, partial or general. *Primitive* peritonitis, from exposure to cold and hence often spoken of as rheumatic peritonitis, is extremely rare; still it does occasionally occur.

Peritonitis is, however, most commonly met with as a consequence of some other disease or injury. Wounds and contusions of the abdomen, accidental or surgical, may give rise either to partial or general peritonitis. The most common cause, however, of peritonitis, and especially of general peritonitis, is some disease of the abdominal viscera, such as simple perforating ulcer of the stomach or duodenum; tubercular, typhoid, dysenteric, or cancerous ulceration of the intestine; disease (abscess, ulceration, etc.) of the vermiform appendix or cæcum; intestinal obstruction; diseases of the liver, such as abscess of liver or cysts, or acute hepatitis; ulceration and perforation of the gall-bladder or bile ducts; diseases of the pelvic viscera, as inflammation of the uterus (puerperal fever), Fallopian tubes or ovaries, or disease of the bladder. In all these cases the peritonitis

must be regarded as septic, and depending on the passage of micro-organisms into the peritoneal cavity.

Acute peritonitis also occurs in connection with certain *general* diseases, as in Bright's disease, in septicæmia, and in some exanthemata. When it accompanies lesions of the abdominal and pelvic viscera it is often local and partial, and limited to the vicinity of the visceral disease causing it; the same is also frequently the case when it is due to external injuries and surgical operations, but when it is caused by perforation of the stomach, or any of the hollow viscera, and their contents escape into the peritoneal cavity, it is usually severe and general.

Tubercular peritonitis is a special form of peritonitis which will be considered apart.

The characteristic **symptoms** of acute diffuse peritonitis are these: *very severe abdominal pain and tenderness*—often accompanied with grave *collapse*—the pain is so severe that the patient dreads the slightest touch or movement, and, therefore, lies on his back with his knees drawn up so as to relax the abdominal walls as much as possible and keep off the pressure of the bedclothes. *Abdominal distension and tympanites:* This is believed to be due to the inflammation involving the external coat of the bowel, or at any rate leading to such a disturbance of innervation of the muscular coat that a sub-paralytic condition of the intestinal walls is produced, so that they become greatly dilated; hence the tympanites. Hence also another symptom that almost invariably attends acute diffuse peritonitis (unless it should happen to have supervened on some other affection which has been attended with diarrhœa), and that is absolute *constipation.* Owing to the great pain attending any movement of the intestines or abdominal wall, and owing also to the pressure on its lower surface of the distended intestines, the *diaphragm* moves but little in respiration; the inspirations are therefore very shallow, and the *respirations* are *greatly quickened* and *wholly*, or *almost wholly, thoracic.*

The digestive functions are practically suppressed. There is entire loss of appetite; the tongue and mouth are red and dry; there is thirst, nausea, and vomiting, and the matters vomited have often a *green colour*. The countenance is usually pale, the features pinched, and the expression anxious. The pulse is small, hard, and rapid, of the kind that is termed wiry. The skin is dry and hot, and the temperature raised often to 104° F., or even 105°. The urine is high-coloured and scanty, and passed with pain and difficulty. If much serious effusion should occur later on, percussion will disclose some dulness in the flanks.

In the gravest cases, viz. those due to perforation of the stomach or intestines, there is usually marked collapse, and, in the great majority of cases, a rapidly fatal issue.

When the exciting cause has not been of such extreme gravity the symptoms may subside, and the patient recover. Adhesions between coils of intestine, or between the walls of the intestine and the abdominal walls, are apt to be left behind, and habitual constipation may thus originate.

In some cases the peritonitis is *latent*, and not disclosed during life by any marked or characteristic symptoms.

The history and symptoms of local partial peritonitis, as, for instance, in the right iliac fossa, are usually merged in those of the disease of which it is a complication; these have been discussed under *appendicitis*.

We may now proceed to consider the **treatment** of acute peritonitis. In all cases the cause must be searched for as diligently as circumstances permit of.

The suggestion that in a case of acute peritonitis resulting from a perforating gastric ulcer the stomach should be washed out with the stomach pump in order to prevent further extravasation of its contents into the peritoneal cavity, is scarcely a practicable

one. Generally the patient is in a state of collapse, when such a procedure would be impossible; and even if otherwise, the disturbance of the patient which such a procedure would necessitate might cause more harm than good, and lead even to more injury to the peritoneum than a mode of treatment calculated to keep the stomach perfectly still and at rest.

In a great many cases in which acute peritonitis is dependent on intestinal obstruction, or on the entrance of septic substances into the peritoneal cavity, and the exudation is purulent, surgical intervention, and the opening of the peritoneal cavity by *laparotomy*, and its irrigation by warm water or some aseptic solution, may be the best mode of treatment—a procedure to the consideration of which we propose to return.

We are not disposed to recommend general bleeding in any of these cases, but the advantage of the local abstraction of blood by leeches, and its influence in relieving pain, is generally admitted. In an acute peritonitis in which no definite and obviously removable local cause can be discovered, the treatment may be commenced by the application of from ten to thirty leeches to the abdominal surface, and particularly to that part which seems to be especially painful; this may be followed by the application of a light hot linseed poultice sprinkled well with laudanum. Ice-cold compresses repeated every ten minutes, or the application of cold by means of Leiter's tubes, have been found of value by some physicians, especially in Germany; but in England patients rarely seem able to bear them, and warm applications are much more grateful.

In robust or previously healthy subjects it is quite possible that if the case be seen quite early the treatment by ice-cold compresses may be of great utility, but in order that they may produce a good effect it is necessary that they should be renewed *at short and regular intervals with great assiduity.*

There are two views prevalent as to the medicinal treatment of acute peritonitis: one, the older and perhaps the more generally accepted view, is that the bowels should be kept *at rest*, by the exhibition of opium; the other, a modern view, that the bowels should be cleansed of their septic contents by saline purgatives. We propose to refer first to the older method, and in the next place to the modern one—the latter is not, of course, intended to apply to cases of gastric or intestinal perforation, in which any excitement of intestinal peristalsis would probably be disastrous.

In order to relieve the pain and vomiting, and to keep the bowels at rest, opium must be given: 1 grain of the extract or powder may be given every hour until the patient is brought distinctly under the influence of the drug, *i.e.* is free from pain. In cases of gastric ulcer and perforation, when opium cannot be given by the mouth, and in cases of obstinate vomiting, a few $\frac{1}{4}$-grain doses of sulphate of morphia may be given hypodermically every two hours, or small starch enemata each containing 20 minims of tincture of opium may be administered every hour. It is important to remember that opium is very badly borne by persons with Bright's disease, and it will be rarely advisable to give this drug, even in small doses, in cases of peritonitis occurring in the course of that affection; and in *all* cases it should be remembered that the object of giving opium is to relieve pain and shock, and that when the pain is relieved the opium should be discontinued.

It is scarcely necessary to say that the patient must be kept absolutely at rest; indeed, all movement is so painful that he will rarely show any indisposition to obey this injunction. Treves calls attention to the natural tendency of patients with acute peritonitis to hold the hands above the head—a posture which, by acting on the lower part of the thoracic wall, assists in diminishing the tension within the abdomen

—and he points out that "it is cruel to insist that the hands shall be kept beneath the bedclothes," as some nurses may be prone to do.* A cradle may be arranged over the body to keep off the weight of the bedclothes.

During the acute stage the digestive functions of the stomach are in abeyance, and it is useless to attempt to give nourishment by the mouth; the thirst should, however, be relieved by sucking quite small fragments of ice, or if the patient prefer a little *warm* fluid, a few spoonfuls of hot water or hot weak tea may be given. The thirst may also be relieved by injecting 6 to 8 ounces of warm water into the rectum. Nutrient enemata and stimulants will in most cases have to be given by the rectum to maintain the patient's strength and prevent collapse. When the vomiting has passed away a little iced milk and water, or thin gruel, or cold consommé, may be given by the mouth, and if the other severe symptoms subside, a gradual return to stomach feeding may be adopted, except in cases of perforating gastric ulcer, and in the rare case of recovery from this form of acute peritonitis (and some cases do recover) rectal feeding must be maintained for some weeks.

If the vomiting is very troublesome and there is no reason to fear the existence of gastric perforation, we may endeavour to relieve this symptom by table-spoonful doses of lime water, or small effervescing draughts containing 4 or 5 minims of dilute hydrocyanic acid in each, or by creasote in 1-minim doses shaken up with an ounce of lime water. Distress from excessive tympanites may be relieved by passing a long tube into the rectum, or, if the acute stage has passed away, by the administration of a turpentine enema and the application of turpentine stupes.

Greig Smith† recommended puncture of the intestine for the relief of this symptom; he maintained that by allowing the escape of large volumes of gas

* Allbutt's "System of Medicine," vol. iii., p. 626.

† "International Clinics," 1893 (third series), vol. i., p. 194.

it relieved the bowel of dangerous internal pressure and the heart and lungs of equally dangerous external pressure; but it is a method that has never obtained general acceptance.

As the inflammation subsides and the bowels recover muscular tone, spontaneous discharge of their contents will take place, and if this should be too long delayed it may be hastened by the administration of enemata of olive oil mixed with soap and water. In protracted cases of a low adynamic type full doses of *quinine* may be needed to maintain the patient's strength.

Also, when the peritonitis is *local and partial*, the application of leeches and the use of opium, especially its external local application, are the best means of affording relief.

These are the measures which are generally adopted in the management of cases of acute peritonitis which are not considered to call for surgical interference.

But much discussion has arisen with regard to the use of **opium.** No doubt this drug has a remarkable action through the vaso-motor nerves on the capillaries of *serous* as well as of *mucous* membranes, causing their contraction, and so diminishing congestion and lessening exudation. Opium, therefore, when given at the onset of the inflammation, probably exerts a direct remedial local effect on the vessels of the inflamed membrane; it keeps the inflamed parts at rest by checking peristaltic action, and it quiets the nervous system and saves the strength of the patient by relieving pain.

In cases caused by perforation of one of the hollow viscera, by arresting peristaltic movement it prevents, to some extent, the further escape of the stomach or intestinal contents into the peritoneal cavity; and in cases where these foreign substances are shut off from the rest of the peritoneal cavity by local adhesions, by keeping parts at rest it prevents their breaking through.

The question as to the amount of opium that may be given must be determined by each individual case. Some patients are very sensitive to its effects, and are readily narcotised by even small doses—others require much larger doses to produce narcotic effects; and it must always be borne in mind that the presence of intense pain and acute inflammation seem to exhaust and dissipate, so to speak, a great deal of its narcotic effect, and, therefore, very much larger doses are needed in order to produce the full remedial effect of the drug. The criterion of the sufficiency of the dose is the relief of pain, and it is best to give one full dose at starting, and repeated moderate doses at short intervals until the pain is relieved. The equivalent of 2 grains of solid opium may be given at first, and 1 grain every hour until its full effect is produced. This plan of administering opium is not advisable in *obstruction* cases, in which hard, impacted fæces may possibly be the cause, and in such cases the sub-paralytic condition of the intestinal walls is aggravated, and it becomes excessively difficult to excite them afterwards to efficient contraction. But in such cases the peritonitis is usually localised and not general, and would have been preceded by a history of obstinate constipation or a chronic intestinal catarrh. We must be most sparing in our use of opium in these cases. It would be best to limit it to local and external application or to a single hypodermic injection of morphine and atropine. So also in the cases dependent on causes which are only remedial by surgical operation, the prolonged and excessive use of opium may no doubt relieve the pain in such cases, but by masking the symptoms it produces a false sense of security, and precious time may be lost and the patient's chances of recovery greatly diminished.

In giving opium it is important to give it in a form that can be readily absorbed. When there is great gastric irritability and vomiting there may be some difficulty in ensuring the retention of opium in the fluid form in the stomach, and it will then be

advisable to give it in the form of *small* pills, and in order that these may dissolve readily they should be made in a special manner. Six grains of the extract of opium should be rubbed down with 6 minims of the tincture of opium, and enough powdered sugar added to make it into the consistency for making pills; the mass should then be divided into twelve pills, and one of these given every quarter of an hour until the desired effect is produced. Morphine may, of course, be given hypodermically, but it is apt to aggravate the nausea and sickness with some patients, and it often exerts a far more depressing effect on the heart than opium given by the stomach.

As we have already pointed out, a sort of reaction has recently set in against the routine administration of excessive quantities of opium in all cases of acute peritonitis, and the consequent paralytic condition of the intestinal walls and the locking up of septic substances in the intestinal canal to which it gives rise. And it appears to be worthy of consideration whether the indiscriminate use of opium is always wise in cases of the kind we are discussing. Meigs has argued, from his experience after surgical operations, that the exhibition of salines in large doses *at the very onset* of an attack of peritonitis is found to check the inflammatory process by withdrawing fluid from the intestinal and abdominal vessels through the watery stools they produce. And it is possible that such a method of treatment in such cases as he has in view may be more useful and more rational than that of locking up excrementitious matters in the bowels by opium. But the physician rarely sees cases in that very early stage, and the risks attending the excitation of the action of the bowels by purgatives at a subsequent period of the disease are too real to be lightly disregarded. We think, however, that there are many cases in which the aseptic or antiseptic action of washing out the large intestine by copious enemata of warm water might well be combined with just as much opium as will relieve pain

and nervous distress, and it might, by diminishing meteorism and painful distension of the bowel, really minister to the comfort of the patient. We also would urge greater moderation in the use of opium, especially with a view to the possible early intervention of the surgeon, whose chance of successful operation is often greatly diminished by the intestinal muscular and reflex paralysis induced by the too free exhibition of narcotics.

Graves, and many of the past generation of physicians, combined calomel with opium in the treatment of acute peritonitis, and they may not, after all, have been wrong; for the calomel would act as an *intestinal antiseptic*, and the opium would prevent its having any immediate purgative effect, while after the severe symptoms had subsided, and the use of opium could be suspended, the eliminative action of the calomel would probably come into useful play.

The method of treatment by saline purgatives has been ably advocated by Professor G. E. Fowler,* of New York. Recognising the septic origin of peritonitis, and that the chief danger in the disease consists in the absorption of toxic products, he maintains that measures should be adopted to eliminate those products through the intestinal canal, and thus also relieve distension and promote the absorption of peritoneal exudates. Free catharsis should, however, be instituted *early*, before vomiting has become persistent and intractable. Later on, when general peritonitis is fully developed, the period of usefulness of purgatives is passed, and they only augment the nausea and vomiting and increase the discomfort of the patient. The employment of opium, he admits, "now finds its legitimate place in the case."

The purgative he employs is magnesium sulphate, in the dose of 4 drams in just enough water to dissolve it, followed by dram doses every hour, until either "decided response to its action results, or it becomes

* Hare's "System of Practical Therapeutics," vol. iii., p. 438 (second edition), 1901.

evident, by the increase in the nausea and vomiting, that it is useless longer to expect it to act." In some cases he finds it better to give $\frac{1}{8}$th of a grain of calomel hourly. He has found this sometimes produce free catharsis without vomiting.

To return to the question of *surgical intervention* in cases of acute peritonitis. It is admitted on all hands that severe acute general peritonitis, especially in children, is almost invariably secondary to some visceral lesion, and is septic. In adults, we believe, there are certain cases—very few—which originate in chill and are of a rheumatic nature, and for these the salicylates should be prescribed; we are also satisfied that some slight and partial cases occur in young children, either from chill or from irritating ingesta, or from both. But we should be disposed, from our own experience, to assert that these two latter forms can be distinguished by their relatively less severe symptoms, and by their responding quickly to warm local opiate applications, and to enemata of warm water, with or without a saline or calomel aperient, as may be judged expedient.

But the great majority of cases belong to the former type, and we strongly urge that in these cases early surgical co-operation and consultation should be invited. Many of these cases are connected with suppurative appendicitis, and in such, and, indeed, in all suppurative and septic cases, laparotomy and flushing with a hot aseptic lotion and drainage of the abdominal cavity seem to offer the *only chance* of cure.

It is clear from the foregoing that the appropriate treatment of individual cases of peritonitis depends upon many considerations, and needs highly skilled discrimination. Some cases claim opium treatment, cautiously carried out; a limited number, if seen at the onset, may be best treated by saline purgatives, and in others surgical measures must be applied as early as possible. It may be as well, here, to mention that Treves' experience does not give much

support to the advocacy of purgatives in this disease. He says, "When general peritonitis has once established itself an aperient is unavailing."*

Tubercular peritonitis is more frequently *chronic* or sub-acute than acute. It may, however, occur as a part of a general acute miliary tuberculosis, but that is not a condition with which we are now concerned.

The occurrence of tubercular peritonitis is usually associated with the presence of tubercle in other organs; as *e.g.* tubercle of the sexual organs, the uterus and Fallopian tubes in women, the testes in men; or tuberculous ulcers of the intestine; or tubercular deposits in the lungs or pleura. In children it is often associated with intestinal tubercle and secondary tubercular affection of the mesenteric lymphatic glands, and it then presents that form of disease which is known as *Tabes mesenterica.*

It would seem, from the successful treatment of tubercular peritonitis in children by laparotomy and other means, that tubercle of the peritoneum must be in some cases primary, and more prone to undergo curative changes than tubercle in other organs. This fact has recently been established.†

The early symptoms of tubercular peritonitis are often very obscure; sometimes it comes on abruptly as a severely acute peritonitis, and then its nature is very likely to be misunderstood; one such case which came under our observation had been diagnosed as one of perforation of the bowel; and sometimes the disease is quite latent, and it has been discovered accidentally in operations for hernia or ovarian tumours. Shifting abdominal pains, with emaciation, and perhaps diarrhœa, loss of appetite, a moderate evening rise of temperature,‡ tenderness on pressure over the abdomen, the surface of which may feel

* Allbutt's "System of Medicine," vol. iii., p. 629.

† *See* Clinical Lecture by the Author, *Lancet*, March 16th, 1901.

‡ Sub-normal temperatures have not unfrequently been recorded.

hot as well as hard and resistant, are the symptoms that may be looked for. There may be retraction or there may be swelling of the abdominal cavity; and in the latter case the effusion of fluid may give rise to fluctuation. When this disease occurs in children it is much easier of detection than in adults. The tumid, tender belly, resonant in parts and dull in parts, with occasionally a lumpy feeling, the pinched face and wasted limbs, and general discomfort and fretfulness, together form a fairly characteristic picture. Moreover, in many the omentum is found to be curiously indurated and rolled-up, as it were, into a roundish or elongated tumour, stretching across the abdomen above the umbilicus. We may, of course, have at the same time evidence of the deposit of tubercle in other organs.

Ascites is common, but the exudation is often sacculated, and has often been mistaken for an ovarian cyst.

The successful **treatment** of these cases of tubercular peritonitis, surgical or otherwise, must, of course, depend greatly on whether the disease is limited to the peritoneal cavity,* or whether the peritoneal tubercle is only a part of a more widely spread tuberculosis. A far more hopeful view is now taken of these cases than formerly prevailed.

In a previous edition we recorded a rapid recovery from tubercular peritonitis, with much ascites, in a boy of twelve; this was a chronic or sub-acute form, and the treatment consisted chiefly in painting iodine paint over the *abdomen* daily, or on alternate days, as it could be borne, and then smearing this with a layer of olive oil to prevent evaporation. At the same time he took half a grain of iodoform dissolved in a dessert-spoonful of cod-liver oil, after food, three times a day. The improvement began early, and was steadily maintained. We have still more recently published

* Prof. W. Osler ("Tubercular Peritonitis," Johns Hopkins Hospital *Reports*) says: "In many cases the process is entirely local. In five of seventeen cases of which I have *post-mortem* notes the condition was confined to the peritoneum."

the particulars of three consecutive cases in which cures followed a similar line of treatment. Iodoform was given internally in half-grain doses, and an ointment composed of equal parts of iodoform ointment and cod-liver oil was rubbed into the surface of the abdomen twice daily.*

It is highly probable, as suggested by Osler, that spontaneous cure occurs in many cases of peritoneal tuberculosis just as it does in pulmonary tuberculosis, by the tubercle undergoing retrograde, fibroid, and sclerotic changes.

Fagge† remarks "that in children tubercular peritonitis is capable, in the majority of cases, of being cured by the local application of *linimentum hydrargyri.*" The liniment is spread freely over the surface of a flannel belt, which is stitched round the abdomen. He has seen the greater part of the ascitic fluid removed within a few days under such treatment, together with improvement in health and strength. Cod-liver oil and syrup of the iodide of iron may be given at the same time.

In cases with much ascitic fluid in children repeated aspiration or tapping has been attended with successful results.

But a very important question in connection with the treatment of tubercular peritonitis is, what are the cases in which we should recommend the operation of *laparotomy?*

According to Prof. Watson Cheyne‡ the best results are obtained in the early stage, and when there is always more or less ascitic fluid in the peritoneal cavity; in this stage there is "not necessarily any matting together of the intestines or shrinking or adhesion of the omentum and mesentery." But in advanced chronic cases you may find adhesions and fibroid induration of the omentum and mesentery

* *Vide* Clinical Lecture by the Author on the "Treatment of Tuberculous Peritonitis," *Lancet*, March 16th, 1901.

† "Principles and Practice of Medicine," vol. ii., p. 320.

‡ Harveian Lectures on the "Treatment of Tuberculous Diseases in their Surgical Aspects," 1900.

—they become matted together, thickened, and shrunken. The intestines may also be bound together by new fibrous tissue, the tubercles, too, may be found coalesced into large masses undergoing caseation, and the mesenteric glands may be enlarged and caseous. When the disease has reached this stage the conditions are distinctly unfavourable both for surgical and medical treatment. But Watson Cheyne thinks it an error to operate too soon, for if operation is done too early the disease is apt to return.

He recommends that medical treatment should be given a reasonable time, which he estimates at from four to six weeks in the acute cases and from four to six months in the chronic ones. The operation he recommends is a very simple one; in cases with effusion without adhesions the abdomen should be opened in the middle line below the umbilicus and the fluid allowed to run out, aided by turning the patient on his side and "perhaps removing some of it by means of sponges," then stitching up the wound again. He does not recommend washing out the peritoneal cavity unless the effusion is purulent; in that case he advises the use of salt solution for this purpose and then introducing a little iodoform and glycerine emulsion into the cavity before closing it. He also urges that medical measures should be superadded to the surgical ones as soon as possible. Ebstein also supports Watson Cheyne's opinion that "simple opening of the peritoneum" is best, "without antiseptics and without washing out or drainage."

Some writers draw a sharp distinction between cases of tuberculous peritonitis with ascites and the plastic form in which the peritoneal cavity is obliterated by adhesions, and they maintain that operative interference in the latter is "useless and worse than useless." Watson Cheyne does not hold this view. He says: "All, even the gravest forms, show some good results, and there is *no* form in which we can say that laparotomy is absolutely useless." He states that he has "had success in the

dry form as well as in the ascitic." He considers that the most favourable cases are those with *localised* ascites, and the next those with *diffused* ascites. Then comes the fibro-adhesive form—when moderate in extent and no ascites. In cases where the abdomen contains large caseating masses, successes are not frequent, but he maintains that they do sometimes occur. He does not consider the co-existence of early phthisis a counter-indication, but with advanced phthisis the results are not good. He is doubtful if laparotomy does any good in cases with intestinal ulceration. Then as to the proportion of cures in cases operated on. The same authority tells us that something like 75 per cent. are improved or cured by laparotomy, but he believes that if all cases were operated on, not merely selecting the most favourable ones, 50 per cent. would probably be the outside limit of improvement or cure. If, on the other hand, the more favourable cases only were treated by laparotomy the percentage of successes would be much higher. Second or third operations may succeed where the first fails and fluid re-accumulates. As to the rationale of the cure of tuberculous peritonitis by this simple surgical operation, Watson Cheyne admits that we are "absolutely in the dark." We think, however, his own suggestion is a reasonable one—viz. that after the removal of the fluid from the peritoneal cavity by incision, serum having anti-bacterial properties may be poured out, and so the morbid process be arrested.

The important fact resulting from these observations is that an apparently *very slight change* in the environment of a pathogenitic organism suffices to arrest or nullify its activities, and to lead to its disappearance. This consideration led us to reflect how iodoform inunctions (together with iodoform internally) act in curing tuberculous peritonitis.

When iodine of potassium is given by the stomach, in a short time the presence of iodide can be detected in the saliva and in the urine. So when iodoform is

rubbed into the skin of the abdomen in a young person it probably rapidly enters the blood and is, if regularly applied, continuously eliminated in the secretions, *including the secretions into the serous cavities*, and as these do not pass out of the body as the secretion of the kidneys does, they must, in course of time, become pretty richly charged with iodine compounds—at any rate sufficiently so to act as antitoxin to the tubercle toxin or as anti-bacterial to the bacilli. The first thing to be determined was whether the iodoform in the ointment, when rubbed into the abdominal surface, was absorbed into the blood quickly and eliminated by the secreting organs, such as the kidneys. Dr. Still has been so good as to make this observation for us at the Children's Hospital in Great Ormond Street. He found, first, that iodoform ointment is excreted and easily recognisable in the urine as iodine or the salts of iodine; and, secondly, that the rate of excretion is very rapid. When half a dram was applied to the abdomen it was recognisable in the urine four hours later, and apparently, after a second application, it reappeared in the urine in two hours' time. When only 15 grains were applied in another case it was recognisable in the urine 15½ hours after application. We have proof here of the rapidity with which iodoform is absorbed by the skin, enters the blood, and circulates as an iodine compound through the tissues of the body and is eliminated into the secretions.

Now, it is an interesting circumstance in this connection that the idea that iodine is an antitoxin to tubercle has long been in the minds of physicians. We use the word "antitoxin" in a wide and general sense.

Quite recently* two Italian physicians have recorded a case of tuberculous peritonitis in which a cure quickly followed the injection of a solution of iodine made by dissolving 15 grains of iodine and 30 grains of iodide of potassium in one and a half ounces of water. They injected first half a syringeful and then a syringeful in the genital region daily for ten days,

* *Brit. Med. Journal*, Epitome, September 9th, 1899.

and then on alternate days. After about a fortnight some of the fluid was withdrawn from the peritoneal cavity and examined bacteriologically; culture preparations were made, and guinea-pigs were experimented on, but no tubercle was found. After ten weeks of treatment the patient was discharged cured.

Professor Thoma, of Geneva,* has advocated the treatment of tuberculous peritonitis by creasote given in enemata. He gave at first 5 minims, increased afterwards to 15 minims, in four ounces of emulsified cod-liver oil, once daily. He continued this for some weeks, and then interrupted the treatment for five or six days. He obtained good results. He remarks that "laparotomy is no doubt the best and quickest of all methods for dealing with those cases in which the peritoneum is covered with miliary tubercles, but," he very sensibly adds, "it is always a serious operation, and one also which not every practitioner is competent to perform, and moreover parents often object, and physicians would gladly welcome other methods."

ADDITIONAL FORMULÆ.

For diarrhœa in peritonitis.

℞ Acidi tannici, gr. xv.
Opii puri, gr. j ad ijss.
Pulveris acaciæ, ʒj.
M. et divide in pulv. x. A powder every two hours.
(*Prof. Braun.*)

Opium powders for peritonitis.

℞ Pulveris opii, gr. vijss.
Sacchari albi pulveris, ʒjss.
M. et divide in pulv. xij. A powder every two hours.
(*Bamberger.*)

For severe vomiting in peritonitis.

℞ Morphinæ hydrochloridi, gr. jss.
Aquæ laurocerasi, ʒjss.
Misturæ amygdalæ, ʒvj.
M. f. mist. A tablespoonful every hour. (*Braun.*)

Opium and belladonna pills for peritonitis.

℞ Pulveris opii, gr. ½.
Extracti belladonnæ alcoholici, gr. $\frac{1}{16}$.
Bismuthi oxydi, gr. j.
M. f. pil. To be taken four times a day. (*Whitla.*)

* *Lancet*, January 16th, 1897, p. 159.

Aconite and opium in peritonitis.

℞ Tincturæ aconiti, ʒj.
Tincturæ opii ad ʒivss.
Alcohol diluti, ʒijss.
M. f. tinct. Ten to fifteen drops every hour or two.
(*Bartholow.*)

Morphine powders for peritonitis.

℞ Morphinæ hydrochloridi, gr. ij.
Sacchari albi, gr. xxx.
M. et divide in pulv. vj. A powder every hour or two.
(*Braun.*)

Naphthol camphor in tubercular peritonitis.

After the withdrawal of rather more than a pint of fluid from the abdomen in a case of tubercular peritonitis in a boy thirteen years of age, about 3 drams of a solution of naphthol camphor was injected into the abdomen, and complete recovery followed. Naphthol camphor is a viscid liquid made by mixing 1 part of β-naphthol with 3 parts of camphor.
(*Spillman.*)

Part II.

DISEASES OF THE HEART AND BLOODVESSELS AND OF THE BLOOD AND DUCTLESS GLANDS.

CHAPTER I.

TREATMENT OF ACUTE AFFECTIONS OF THE HEART AND PERICARDIUM.

ACUTE PERICARDITIS.—*Etiology:* Acute Rheumatism—Bright's Disease—Gout—Scurvy—Diabetes—Puerperal Septicæmia—Scarlet Fever—Tuberculosis. Forms of Pericarditis—Often latent—Symptoms. *Indications for Treatment:* Sodium Salicylate—Alkalies and Aconite—Opium—Aperients—Ice-bag—Leeches—Bleeding—Warm Fomentations—Quinine in Effervescence—Blisters—Iodine—Potassium Iodide and Digitalis—Mercurial Inunctions—Tonics—Food and Stimulants—Puncture and Aspiration—Incision in Purulent Effusions.

ACUTE ENDOCARDITIS.—Its Nature—Etiology—Micro-organisms. *Indications for Treatment:* Usually those of Acute Rheumatism—Alkalies—Salicin and Quinine—Value of Water—Formulæ—Opium—Ice-bag—Blisters—Alcohol—Digitalis—Perchloride of Iron—Belladonna Plaster—Rest—Potassium Iodide—Dr. Caton's Treatment.

MALIGNANT OR ULCERATIVE ENDOCARDITIS.—Its Relation to Septic Processes and to Microbic Action—Septic Emboli—Generally Ends Fatally.—Treatment with Antiseptics, with Quinine, Arsenic, Yeast Culture, Anti-streptococcus Serum, Nuclein. Additional Formulæ.

IN considering the subject of the **treatment of diseases of the heart,** we shall be chiefly concerned with those *chronic* affections of that organ which involve some lesion of one or other of its sets of valves, or of its muscular structure, or of both; but we shall also have to discuss the treatment of *acute* affections of the heart, and of its covering, the *pericardium*. This, however, will be done briefly, because these *acute* inflammations generally arise as complications of other diseases, the full examination

of the treatment of which will be found under their appropriate headings.

Pericarditis.

Pericarditis rarely occurs as a primary idiopathic disease; some authorities, however, believe it does so in childhood; it is almost invariably secondary to some *general* malady, or it occurs as an extension of inflammation from some adjacent part. Frequently it is only a part of a general inflammation of the heart which affects the myocardium also, and sometimes the endocardium.

Acute rheumatism is by far the most common cause of pericarditis, especially in children and young adults, and the pericarditis has been observed, more particularly in the former, occasionally to precede the joint affection. *Bright's disease* is another common cause of pericarditis. Gout, scurvy, and diabetes have also been regarded as causes of this disease. Pericarditis is also apt to occur as a consequence of certain *septic* processes, as *e.g.* in puerperal fever. It sometimes appears as a complication of the eruptive fevers, particularly of scarlet-fever, in childhood. A *tuberculous* form occurs in connection with tuberculosis of the serous membranes. It may arise by extension from left pleuro-pneumonia, and it may occur in consequence of disease of the adjacent chest-wall, or mediastinal structures, or neighbouring abdominal viscera, and it may be caused by pyæmic abscess of the myocardium.

In many of these connections it is simply one of the manifestations occurring in the progress of an inevitably fatal malady.

Three forms of pericaditis have been described:—

1. A *dry* form, in which there is simply a fibrinous exudation on the surface of the serous membrane.

2. Pericarditis, *with effusion*, either sero-fibrinous, hæmorrhagic, or purulent.

3. An adhesive form, in which the *pericardium* becomes adherent to the surface of the heart.

The physical signs of acute pericarditis should be carefully looked for in the course of all those affections which are prone to give rise to this disease. This is the more important, as it is apt to be **latent**, especially when it occurs in connection with Bright's disease, and *general symptoms* may be entirely absent. More commonly, however, complaint of *pain* in the præcordial region is the first indication of the occurrence of pericarditis. The *pain* is often intense, and radiates over the chest and down the left arm, and there is great tenderness on pressure over the cardiac and epigastric regions. Great and distressing *dyspnœa* is also another prominent feature in acute pericarditis, especially when there is a large amount of effusion. Sometimes there is a great disturbance of the cardiac action, with palpitation and a rapid and irregular pulse.

The **indications for treatment** are, first, to moderate and reduce the inflammation as quickly as possible, by regulating the cardiac action and lessening its rapidity; secondly, to relieve pain and distress; thirdly, to promote the absorption of the effusion; and fourthly, to remove it by operation when its presence and amount give rise to dangerous symptoms from pressure on the heart. Absolute rest in bed is, of course, essential.

In rheumatic cases, *sodium salicylate* or *salicin* in combination with *potassium bicarbonate* may be given so long as the arthritic symptoms remain unrelieved. Some American writers on therapeutics object to the use of salicylates in cases of rheumatic *pericarditis*, but urge the use of alkalies, together with full doses of aconite to lower the cardiac action. We cannot share this view, for if the salicylates (or salicin) are indicated in the treatment of ordinary attacks of polyarthritic rheumatism, the additional affection of a visceral *joint*—as, in a certain sense, the pericardium may be termed—can hardly contraindicate its use. Moreover, if a depressing drug like aconite is indicated in these cases for the sake of

reducing the cardiac action, why not sodium salicylate, the remedial effect of which in acute rheumatism is usually accompanied by a rapid lowering of the pulse frequency? We often find, on the third day of treatment with sodium salicylate in acute rheumatism, the pulse beat reduced to 60 in the minute.*

Opium combined with saline diaphoretics is very useful in those cases in which there is much præcordial *pain.* We prefer to give it in the form of Dover's powder, 5 grains with a dram or two of liquor ammonii acetatis, every three or four hours, until the pain is subdued. To ensure a free action of the bowels, especially during this opium treatment, an efficient saline aperient should be given daily. Two or three drams of sodium sulphate in an ounce and a half of infusion of senna usually answers well.

The application of an **ice-bag** to the præcordial region is a valuable remedy for allaying the inflammation and quieting cardiac action. It is not very popular in England or in America,† but when applied *early* and thoroughly it has proved in many cases very efficacious. Sansom warmly advocates its employment.‡ When the use of the ice-bag is objected to, the pain and distress may generally be greatly relieved by the application of a few leeches over the sternum, followed by a hot linseed poultice sprinkled with laudanum. General bleeding is rarely called for, although Fagge observes: "When there are symptoms of embarrassed circulation with orthopnœa and distress, an irregular pulse, arterial anæmia, and venous congestion, the abstraction of 4 or 5 ounces of blood from the arm is found in some cases to give remarkable relief, and probably is never injurious."

* We shall have to discuss the use of the salicylates in acute rheumatism in a subsequent chapter.

† Amongst American authors Prof. Osler says, "The ice-bag is of great value" ("Principle and Practice of Medicine," fourth edition, p. 695), while Prof. W. H. Thomson observes, "My experiences with it have *not* been favourable" (Hare's "System of Practical Therapeutics," second edition, vol. ii., p. 310).

‡ *Lancet*, 1900, vol. i., p. 924.

Warm applications, as hot flannels, hot cotton wool, and hot poultices to the præcordial surface, are usually comforting. In rheumatic cases, when the depressing effects of the salicylates is to be feared, or when the joint inflammation is subdued, quinine in moderate doses, 1 to 3 grains, may be given in effervescence in combination with potassium citrate.

When we have a large effusion to deal with, the absorption of which we are anxious to promote, blistering will frequently be found most useful. In rheumatic cases large effusions will constantly be found to disappear rapidly after the application of a full-sized **blister** followed by hot poultices. In renal cases cantharidine applications are, however, to be avoided, but we may then resort to the use of strong iodine paint. Potassium iodide alone, or combined with digitalis and other diuretics, will be found, in the later stages, a valuable agent for promoting the disappearance of the effusion. Mercurial inunctions are still advocated for the removal of slowly disappearing effusions.

If cardiac failure should threaten, supporting remedies must be freely applied, as bark, quinine, and strychnine, with ether, ammonia, alcohol, etc. Light food, but not with too much fluid, for fear of increasing the effusion, should be given. Light puddings, whipped eggs, milk, or bread and milk, oatmeal gruel, and the lighter kinds of fish are suitable.

When a large effusion is seriously compressing the heart and embarrassing its action and causing grave dyspnœa, and especially if it has resisted the application of blisters—or if there is reason (from exploratory puncture with a hypodermic syringe) to believe the effusion to be purulent—removal of the fluid by **aspiration** or **incision** of the pericardium has to be considered.

After carefully percussing and outlining the area of dulness, the nature of the fluid effusion should first be ascertained by puncture with the needle of a hypodermic syringe, carefully rendered aseptic. The

best situation for this and subsequent puncture or incision is the fourth or fifth left intercostal space, about an inch externally to the left margin of the sternum,* so as to avoid the internal mammary artery.

If the fluid is serous or sero-fibrinous, then a fine aspirating needle or trocar should be introduced in the same spot, and the fluid, or a portion of it, very slowly withdrawn. If the fluid is found to be *purulent*, then an incision must be made into the pericardium in the situation already mentioned. The incision should be small at first, and cautiously enlarged. It may be enlarged by cutting or dilating with sinus forceps. The pus having been allowed to escape, a soft drainage-tube must be inserted, and the cavity may be washed out, if necessary, from time to time with a warm boric acid solution. This will often be necessary in order to detach and remove fibrino-purulent caseous masses. But this irrigation must be performed with great care and caution, and we should particularly see that there is always a *free outlet* maintained for the escape of the irrigation fluid, as suddenly fatal mishaps have occurred from the pressure of irrigation fluid on the heart, owing to the accidental plugging of the outlet tube.

J. B. Roberts† recommends an operation for suppurative pericarditis which consists in "raising a trap-door of the 4th and 5th costal cartilages and connecting soft parts and using the tissues of the 3rd interspace as a hinge. The internal mammary vessels and left pleura are thus exposed and pushed to the left"; the object is to avoid the risk of opening the left pleural cavity. Of twenty-six collected cases there were ten recoveries and sixteen deaths. At least nine of the latter were septic, and all the rest had complicating lesions.

During *convalescence* the patient should be carefully

* "In large effusions the pericardium can also be readily reached without danger, by thrusting the needle upward and backward close to the costal margin in the left costo-xiphoid angle" (*Osler*).

† *Medical News*, May 8th, 1897.

watched and protected against all depressing agencies. A prolonged period of almost absolute rest should be insisted upon, as the myocardium is often involved, and the risk of aggravating any resulting cardiac dilatation is not to be overlooked. Light but nourishing food should be ordered, and the diet carefully watched to note if any digestive disturbances arise. Prof. W. H. Thomson * gives small doses (gr. v.) of iodide of potassium combined with tincture of belladonna during convalescence. He thinks it allays a tendency to palpitation. But in mild weather reclining in the open air has both a quieting and strengthening influence.

Acute Endocarditis.

"**Simple**" or "**benign**" endocarditis, the form which is commonly met with, is not regarded by some pathologists as presenting any essential difference in nature from that rarer form which, from its fatal character, is spoken of as "*malignant*" or "*ulcerative*" or "infective" endocarditis. Osler says: "There is no essential anatomical difference, as all gradations can be traced, and they represent but different degrees of intensity of the same process."

But *clinically*, in course, symptoms, and results, the distinction between the two forms is very obvious.

We must consider briefly the pathological nature of this disease, so far as it is at present understood, before we can establish rational indications for its treatment. In simple endocarditis **minute vegetations** appear on the endocardium covering the valves or lining the cavities of the heart. These vegetations are often attached by very slender pedicles, so that they have a cauliflower-like form. They have an irregular, cracked surface, giving them a warty aspect. The appearance of these vegetations is accompanied by a proliferation of the sub-endothelial connective tissue elements. A deposit of fibrin from the blood

* Hare's "System of Practical Therapeutics," vol. ii., p. 311 (new edition), 1901.

occurs on the surface of these projections, so that a *vegetation* has been described as practically "a small area of granulation tissue capped with fibrin." *Micro-organisms* are often found entangled in the deposited fibrin.

In the majority of cases the granulation tissue undergoes cicatrisation, and leaves only a slight nodular thickening of the valve. It is rare in acute febrile endocarditis for a vegetation to be detached and carried as an **embolus** to a distant part of the circulation, but this accident is not uncommon in that form of endocarditis which attacks old sclerotic valves.

The dangerous part of an attack of simple acute endocarditis is the tendency to slow progressive sclerosing changes in the valve tissues, and the ultimate contraction and deformity to which it leads. It is remarkable that it is almost invariably the *left* side of the heart that is affected, except in fœtal life, when the right side of the heart is found affected also, and it has been suggested that the inflammatory poison must need oxygenated arterial blood for its activity. The mitral valve is more frequently affected than the aortic.

With regard to the **etiology** of simple acute endocarditis it must be borne in mind that it does not occur as a disease of itself, but is always a complication of some other affection, and in the vast majority of cases that affection is *acute rheumatism*. It has been suggested that it may be caused *not* by anything in the disease itself, but simply by an altered state of the fluids, "a reduction, perhaps, of the lethal influences which they normally exert, permitting the invasion of the blood by certain micro-organisms" (Osler). It also occurs in connection with chorea, tonsillitis, scarlet fever, acute pneumonia, phthisis, cancer, gout, diabetes, and Bright's disease. It is also prone to occur in a recurrent form, attacking those valves already disabled and crippled by former attacks.

The **indications** for **treatment** are necessarily,

in the first place, those which apply to the disease of which it is a complication; and as this is generally acute rheumatism, it is scarcely possible to consider the treatment of simple acute endocarditis apart from that of acute rheumatism. The first indication for treatment is, therefore, to modify, if possible, the disordered state of the blood which has excited the inflammation. The second indication is more directly applicable to the state of the heart itself—it is to moderate and reduce its more or less excited action, for mechanical activity of the valves tends to increase and aggravate the inflammatory changes. We must strive to procure for the inflamed heart the greatest amount of relative rest.

In the case of rheumatic endocarditis the free use of alkalies so as to maintain and increase the alkalinity of the blood has many advocates. "When they are given promptly," says one writer,* "and with the one object speedily to alkalinise the urine and to keep it alkaline, the heart may be reasonably regarded as safe from serious attack"; and the same author maintains that "heart inflammations have increased in frequency since the introduction of the salicylates in the treatment of rheumatism."

We are not aware of any substantial facts that can be advanced in support of this statement; we believe the best treatment for these cases is a combination of alkalies and salicin, with which we would also combine some moderate doses of quinine. Alkalies and salicylates reduce arterial pressure by stimulating the functions of the skin and kidneys. Another means of modifying the blood condition and its irritating effects on the endocardium is the free administration of diluent fluids, and especially of *pure water*. Instead of giving the patient strong meat essences and broths to drink, which, for aught we know, may have a very injurious influence on the blood condition, we prescribe as much pure warm water

* Prof. W. H. Thomson, in Hare's "System of Practical Therapeutics," vol. ii., p. 301 (new edition), 1901.

as we can get absorbed, slightly flavoured with lemon juice, and we give no food in the early stages (when there are no signs of exhaustion), but milk freely diluted with an alkaline water, a little warm weak broth, and thin gruel. All through the early acute stage the food should be very light. The indication, we venture to urge, is to wash the contaminated blood by passing large quantities of pure water rapidly through the circulating fluid. The alkaline medicines should be given *largely diluted with water.* The stomach cannot absorb large quantities of food and water at the same time, and we consider the latter of the greater importance at the outset of this disease. We suggest the following formula as a most useful combination in cases of rheumatic endocarditis, either threatening or established :—

℞ Salicini ʒj.
Potassii bicarbonatis ʒiv.
Sodii carbonatis ʒij.
Aquæ ad ℥xij.

Misce, fiat mistura. Two tablespoonfuls every two hours while the acute febrile state continues, with two tablespoonfuls of the following mixture :—

℞ Quininæ sulphatis gr. xxiv.
Acidi citrici ʒiij.
Tincturæ limonis ʒj.
Aquæ ad ℥xij.

Misce, fiat mistura.

In this way the patient will get 60 grains of salicin and 24 grains of quinine in 24 hours dissolved in 24 oz. of alkaline solution.*

It has been suggested by Broadbent † that alkalies may lessen the tendency to deposition of fibrin on the cardiac valves by diminishing the coagulability of the blood, and he calls attention to the circumstance that

* Prof. W. H. Thomson classifies quinine amongst cardiac *depressants* (*op. cit.*). We are not aware of any *clinical* facts to justify this. Certain pharmacologists have made, we are aware, such a statement, but it does not accord with *clinical* experience—at any rate, when given in moderate doses.

† "Heart Disease" (third edition), 1900, p. 24.

rheumatic nodules sometimes disappear under their use.

Objection has been made to the use of *sodium salicylate* in these cases on account of its depressing effect, and the preceding formula is not open to that reproach. The advocates, however, of the use of the sodium salt maintain that the pure natural salicylate is not depressing.

When rheumatic endocarditis is accompanied by pain and distress in the præcordial region, a full dose of Dover's powders (12 to 15 grains) should be given at night, and a hot linseed poultice sprinkled with laudanum applied to the præcordia. This will not only relieve cardiac pain, but it will also quiet cardiac excitement. The application of the ice-bag is preferred by some physicians, and we think it valuable, especially in children. The application of blisters to the præcordia has been advocated, and they may be of use in protracted cases.

In the severer forms with very rapid action of the heart and much exhaustion, the free administration of alcoholic stimulants is indicated; in such cases small doses of digitalis and opium are found useful, especially in children; the tincture of the perchloride of iron in full doses has been found valuable in some cases.

During convalescence a large belladonna plaster over the heart will be useful for quieting cardiac action; **absolute repose** must also be long insisted upon after an attack of endocarditis, with the same object. It is clearly of the greatest importance to avoid premature strain on valves softened and impaired by inflammatory changes. The long-continued use of potassium or sodium iodide in small doses, together with a vegetable tonic, after the attack, has appeared to us to be sometimes instrumental in removing the physical signs of valvular changes, and we believe it diminishes the tendency to progressive sclerotic changes both in the valves and in the vascular walls. Great care in diet, which should be of the lightest,

must be observed, and due elimination maintained by the judicious use of aperients.

Dr. Caton * has strongly advocated a method of treatment in acute rheumatic endocarditis, which he maintains he has found very effective in preventing disease of the valves. There is nothing whatever that is novel in his method, or that has not been recommended by other physicians; but he asserts that he has carried this method out more thoroughly and earnestly than others have done!

First, he insists on a *prolonged period of rest in bed.* That has, we believe, been urged by every authority who has written on this subject. The difficulty has always been to enforce this rule amongst the class from whom hospital patients are derived. Of its extreme importance there can be no doubt.

Secondly, he advocates the application of a series of small blisters, about the size of a florin, over the region between the clavicle and the nipple on the right and left sides. He believes the counter-irritation acts by "direct stimulation of the vaso-motor and trophic nerves of an ailing part." Here again we may remark that blistering the præcordial region in rheumatic endocarditis is an old measure which has had its advocates and its objectors. We remember in our student days how the late Sir George Johnson used to object to it as interfering with his auscultation, and, he thought, "doing no good." Dr. Caton considers it of some importance that the blisters should be applied along the course of the first four dorsal intercostal nerves, as they are closely associated with the upper and middle cardiac nerves.

Thirdly, he adopts a view and a practice which we have always advocated, and set forth in this work, viz. that sclerosing and deforming changes in the cardiac valves as a consequence of endocarditis may be to a great extent prevented or lessened by the

* "The Prevention of Valvular Disease of the Heart," London: Clay & Sons. 1900.

long-continued use of sodium or potassium iodide. The removal of any inflammatory effusion into the substance, or on the surface of the valve, may also by this means be promoted. At any rate, we have observed, as we have already said, the physical signs of valvular incompetence to disappear under this treatment in young persons.

During convalescence the presence of anæmia and cardiac asthenia will constantly demand the employment of some cardiac tonic. A combination of iron or arsenic and strychnine generally answers well. It may be associated with the sodium iodide already referred to. Occasionally small doses of digitalis may be needed to steady the cardiac action, but this drug is to be avoided as long as any inflammatory process is going on.

MALIGNANT, ULCERATIVE, OR INFECTIVE ENDOCARDITIS.

This is believed to occur occasionally as a *primary* affection of the endocardium; it is much less frequently a complication of acute rheumatism than the *simple* form; but the endocarditis which occasionally occurs as a complication of acute pneumonia is apt to be of this malignant type. It is prone to occur in connection with all kinds of **septic** processes and all forms of septicæmia. It is characterised, as its name implies, by ulcerative and suppurative processes affecting chiefly the valvular endocardium. The necrotic process leads to superficial or deep ulceration which may even perforate a valve or a septum; and small abscesses may be found at the base of the vegetations. Various *micro-organisms* have been found associated with these ulcerative changes; those most frequently met with belong to the pyogenic group, streptococci, staphylococci, and others, and in pneumonic cases pneumococci have been seen. The transfer of septic emboli from the heart to various parts of the body where they set up septic suppurative processes is one of the most serious consequences of this disease.

Sometimes an ulcerative process attacks the endocardium in cases of *chronic* valvular disease, and symptoms due to diffused emboli often attend the closing scenes of chronic heart affections.

Most cases of ulcerative endocarditis terminate fatally and run a somewhat rapid course; the chief exceptions to this rule occur in some of the cases that are seen in connection with old sclerotic valve disease.

There are, as might be anticipated, few direct indications in this disease for efficient treatment. "In the severer cases the treatment is practically that of septicæmia" (Osler). Quinine in full doses, preparations of iron and arsenic, mercuric chloride, sodium sulpho-carbolate, sodium benzoate, and salol: as large doses of these and other antiseptics as can conveniently be given have been advocated, and appear to answer the only rational indication afforded.

Broadbent* reports a case in which recovery followed the free administration of mercuric chloride, and two other cases in which the hypodermic injection of pure cultures of yeast apparently arrested the disease in one, and caused a marked temporary improvement in the symptoms in another, but he is not disposed to place any reliance on these remedies.

Douglas Powell† states that arsenic is the only drug under a course of which he has seen the disease get well. With regard to the use of **anti-streptococcus serum**, he has collected notes of 14 cases in which it was tried; of these, three were reported cured and 11 were not successful. The dose of anti-streptococcus serum in these cases varied from 10 to 20 c.c., twice a day, the larger dose being gradually reduced.

He also refers to a case that recovered after the injection of yeast culture (20 to 30 minims each second day).

Douglas Powell also suggests the possibility of *nuclein* (employed by Professor Vaughan of Michigan

* "Heart Disease" (third edition), 1900, p. 34.
† Lumleian Lectures, 1899, p. 105.

in tuberculosis) being of use in this affection, but no very definite report of its success is at present available.

There is certainly a disposition prevailing to give further trial to injections of anti-streptococcus serum in this disease. Dr. Mitchell Clarke has reported a successful result from its use.* He gave doses varying from 10 to 20 c.c. of serum obtained at the Jenner Institute. He thought the 20 c.c. dose too large, as it was followed by faintness and a feeble pulse. It is best to begin with 5 c.c. and increase to 15 or 20 c.c. if needful, giving one injection daily.

Acute myocarditis, which sometimes accompanies acute pericarditis and acute endocarditis, presents no special therapeutic indications apart from those already considered.

ADDITIONAL FORMULÆ.

Cooling acid mixture in pericarditis.

℞ Acidi phosphorici diluti, ♏xl.
Syrupi mori, ʒv.
Aquæ ad ℥vj.
M. f. mist. A tablespoonful every hour. (*Bamberger.*)

As a cardiac tonic and febrifuge in pericarditis.

℞ Quininæ sulphatis, gr. vj ad xviij.
Sacchari albi, gr. lxxx.
M. et divide in pulv. vj. One every three hours. (*Bamberger.*)

In ulcerative endocarditis.

℞ Quininæ sulphatis, gr. xij ad xxxvj.
Acidi citrici, gr. xxiv. ad lxxij.
Syrupi limonis, ℥j.
Aquæ chloroformi, ad ℥vj.
M. f. mist. A tablespoonful every three or four hours.

Mixture in convalescence from endocarditis.

℞ Potassii iodidi, gr. xxxij.
Potassii bicarbonatis, gr. lxxx.
Spirit. ammon. aromatici, ʒiv.
Tincturæ cinchonæ comp., ℥j.
Aquæ ad ℥viij.
M. f. mist. A tablespoonful three times a day.

* *Lancet*, vol. ii., 1900, p. 168.

CHAPTER II.

THE TREATMENT OF CHRONIC AFFECTIONS OF THE CARDIAC VALVES.

CHRONIC VALVULAR LESIONS.—General Therapeutic Indications—Etiology—Mechanical Effects and Consequences—Hypertrophy and Dilatation. Treatment of *Compensated* Cases: Regimen—Exercise—Clothing—Avoidance of Excitement—Food and Stimulants—Alcohol—Tea—Coffee—Tobacco—Thermal Treatment—Aperients—Climate—Drugs rarely needed—Digitalis—Iron—Arsenic—Potassium Bromide—Open-air Life. Treatment of *Non-compensated* Cases: Effects of *Mitral* Failure—Pulmonary Engorgement—Dyspnœa—Cough—Expectoration—Hæmoptysis—General Venous Engorgement—Enlargement of Liver—Gastro-Intestinal Catarrh—Constipation—Scanty Albuminous Urine—Cyanosis—Dropsy—Effects of Failure of *Aortic* Valves—Pallor—Cerebral Anæmia—Palpitation—*Pain*—Dyspnœa—Orthopnœa—Frequency of Embolism—*Chief Therapeutic Indication*—To raise the Cardiac Tone—Importance of absolute Rest—*Cardiac Tonics*—Digitalis—Strophanthus—Caffeine—Convallaria—Sparteine—Adonis vernalis—Cactus grandiflorus—Strychnine—Quinine—Coca—Kola—Iron—Aperients. Additional Formulæ.

WE now pass on to consider the management of those chronic disorders of the cardiac mechanism dependent on *disease* of its *valves*, and of the several morbid states which arise therefrom.

In considering the management of valvular diseases we shall have to draw a marked distinction between *compensated* and *non-compensated* cases.

Apart from the treatment of certain complications and special symptoms, the therapeutic problem presented to us in dealing with these cases may be summarised in the three following indications:—

1. To arrest or retard degenerative processes.
2. To diminish the mechanical work of the heart.
3. To raise the tone of the cardiac muscle.

We shall show, as we proceed, what means we have at our disposal for fulfilling these indications.

With regard to **chronic valvular lesions,** we have already seen that these usually originate in

an attack of acute endocarditis, and especially in rheumatic endocarditis; the thickening and deformity of the valve may be but slight at the end of the acute attack, but the valve so injured is liable to undergo further deformity by becoming the seat of chronic endocarditis, which may ultimately lead to serious impairment of its functions.

But chronic endocarditis leading to sclerotic changes in the valves may arise from other causes than rheumatism, as from syphilis, gout, or alcoholism. Another cause of chronic valvular disease, especially of the aortic valves, is *strain* from excessive muscular exertion. In athletic exercises or in severe and sustained muscular labour there is an increased strain imposed on the aortic valves during the ventricular diastole, and this in time sets up chronic endo-arteritis and sclerotic changes in the valve segments. In some cases the chronic affection of the aortic valve is associated with *atheromatous* changes in the adjacent part of the aorta.

The effect on the mechanism of the heart of these valvular changes is either to narrow and constrict the opening guarded by the valve (*stenosis*) and so diminish the outflow through it, or to render the valve incompetent to close the opening as it should do (*insufficiency*), and so to allow of an abnormal backward flow of blood into the chamber from which it had been propelled. In either case dilatation of one of the chambers of the heart must occur from increase of blood pressure within it. When, as is often the case, constriction of the opening is combined with incompetence of the valve, not only is there an abnormal mechanical difficulty interposed in the propulsion of the blood from one chamber to the other, but there is an additional mechanical distending or dilating influence from the over-filling of one of the chambers by an abnormal reflux of blood, so that the chamber receives a backward as well as a forward current. These changes take place, as a rule, gradually, and not abruptly, therefore the insufficiency and conse-

quent dilatation are, at first, only moderate, and the natural reserve force of the cardiac muscle is equal to overcoming the difficulty. But when the insufficiency is considerable, obviously the cardiac chamber chiefly affected must need greatly increased muscular force to propel so largely increased a volume of blood, and this is provided by an increase or *hypertrophy* of its muscular walls, and so long as this hypertrophy is adequate to overcome the mechanical difficulty proceeding from the diseased valve, the valvular lesion is said to be *compensated*, and the circulatory equilibrium is maintained. But when the hypertrophied muscle begins to degenerate, and to be inadequate to overcome the effect of the valvular lesion, *compensation* is said to *fail*, and symptoms dependent on disturbance of the circulatory equilibrium begin to make their appearance. We see, from the foregoing, that cardiac dilatation and hypertrophy are common and necessary consequences of chronic valvular disease, and that the hypertrophy cannot be regarded as in itself a disease, since it usually arises as a natural conservative process.

But **hypertrophy** and **dilatation** of the heart also arise without the existence of valvular disease. Whatever increases the work of the heart may cause its hypertrophy: as, for instance, adherent pericardium, which interferes with and impedes the regular cardiac contractions; and continuous excessive action of the heart, "palpitations," due either to nervous disturbance, such, for instance, as is associated with exophthalmic goitre, or to the action of stimulants, such as tea, coffee, tobacco, or alcohol. Or the increased work may depend on peripheral obstruction, as in general arterio-sclerosis, or on contraction of the smaller arteries from the presence of toxic matters in the blood raising the intravascular tension; or it may be due to prolonged and excessive muscular exertion, which, by compressing the small vessels, acts in the same way, and greatly increases arterial blood-pressure. In all these conditions the

work of the ventricle is increased, and it therefore hypertrophies. Hypertrophy of the *right* ventricle similarly occurs (apart from valvular disease) when any obstruction or increased resistance is encountered in the pulmonary circulation, as in pulmonary emphysema, pulmonary cirrhosis, etc. *No treatment* can be, or indeed should be, directed against this form of hypertrophy, apart from the morbid state that has excited it, as it is mainly compensatory and beneficial.

Dilatation often accompanies hypertrophy, and is dependent on the same causes, *i.e.* on whatever increases the intra-cardiac pressure—which may be either an increased volume of blood to be propelled or an increased resistance to be overcome. This requires no more treatment than does the co-existing hypertrophy. But it is not so with all cases of cardiac dilatation and strain, and we shall reserve what we have further to say on the etiology and treatment of dilatation of the heart until we have considered the treatment of chronic valvular affections.

We will first consider the **treatment** of those cases in which **compensation** is perfect and complete.

Such cases require careful and discriminating management. It may not be necessary to administer drugs, it may even be injurious to do so, but in order to maintain adequate compensation, and to prevent or postpone any disturbance of the same, the most judicious regimenal and hygienic treatment is constantly needed.

There exists some difference of opinion amongst physicians whether patients who are found to be the subjects of a compensated valvular lesion should or should not be informed of the fact. We think that in by far the great majority of cases no harm, but often great good, results from explaining frankly to the patient the true state of the case. The public are rapidly learning that "heart disease" does not necessarily mean premature and sudden death; and if anything could promote such a termination it is to leave them in ignorance of the importance of that

judicious care and caution in their manner of living upon which a continuance of sound health depends. A few highly nervous persons may, perhaps, be better left in ignorance of the fact; but when we reflect how common such affections are, and that discussions with regard to their effects on longevity are constantly occurring, without any kind of reserve, in connection with proposals for life assurance, etc., we are inclined to conclude that the mystification occasionally resorted to is unwise and attended with no good result. It often produces more real alarm than a frank explanation of the actual state of matters. We rarely attempt to conceal from a patient that he has phthisis, or cancer, or Bright's disease; why then should we take pains to conceal from him the fact that he has a far less serious malady?

The **mode of life** prescribed for such a patient should, in the first place, be free from all *strain* or over-exertion, physical or mental. He should be particularly cautioned against indulging in athletic competitions, or undertaking violent or protracted muscular effort of any kind. Gentle, moderate, and regular exercise is useful and necessary, but all running, climbing, rowing, or hurrying of any sort should be condemned. Sudden rupture or failure of compensation can often be traced to some indiscretion of this kind. Occupations entailing great muscular effort or fatigue, or attended by exposure to injurious atmospheric conditions, should be avoided. The clothing should be warm and should fit easily and comfortably.

All emotional excitement, worry, and anxiety should be as far as possible avoided. Sexual relations are, in some forms of cardiac disease, especially injurious. In the male the existence of aortic incompetence makes sexual intercourse particularly risky, and in the female the presence of mitral stenosis renders utero-gestation especially dangerous.*

* We have known several instances of premature death in young women with mitral stenosis, who have become pregnant and have died during pregnancy, or soon after delivery.

The **food** should be plain, nourishing, and digestible, and not excessive in quantity; over-filling of the vascular system or over-distending the stomach with excess of food and drink is to be greatly deprecated. The habitual use of alcohol should be forbidden, and tea and coffee should be taken only in very moderate amounts, and when they are noticed to cause cardiac excitement they should be avoided. Tobacco is always injurious in these cases. The occurrence of cardiac intermissions in such patients may often be traced to the use of tea, coffee, or tobacco, and when these are left off they will disappear.

The subjects of cardiac valvular disease should avoid sea-bathing or Turkish baths, or baths too cold or too hot; but daily tepid sponging followed by friction of the skin is advantageous.

Constipation should be guarded against by the occasional use of gentle aperients, such as a mild aloetic pill at night and a dram or two of sodium or magnesium sulphate the following morning.

A moderately warm, dry, and equable **climate** is that best suited to cardiac patients, where a fair amount of sunshine can be met with in winter, and where protection from damp and cold winds can be obtained.

It is not necessary to prescribe drugs in these compensated cases, so far as the valvular lesion is concerned. Neither digitalis nor iron is needed, and may prove injurious; but the co-existence of anæmia may call for the use of the latter. Arsenic is sometimes more beneficial in the anæmia of these cardiac cases. Sodium bromide is occasionally needed to allay the nervous disturbances which are not unfrequently encountered in compensated mitral cases in women.

When, however, failure of compensation seems to threaten and the cardiac action tends towards irregularity and increased frequency, the long-continued use of some mild iron tonic is often of the greatest

service. It may be combined with small doses of sodium bromide.

In the next place we will review briefly the various morbid conditions which follow the *failure of compensation* in chronic valvular disease. And first we will consider the case of a **non-compensated** lesion of the **mitral valve.**

Whether the lesion be insufficiency and regurgitation, or stenosis and obstruction, the effect on the circulation will be much the same when compensation fails, but it is rare to find a serious obstructive lesion of the mitral without some co-existent insufficiency. In pure mitral stenosis it is through failure of the right ventricle especially that compensation is broken.

Tracing the effects of failure of compensation backwards step by step, we find that the over-full and dilated left auricle being unable to empty itself completely as usual into the left ventricle, an impediment to the outflow from the pulmonary veins arises, and as the right ventricle is no longer able to fully overcome this, dilatation of the pulmonary vessels and engorgement of the lungs follow. This congestion of the pulmonary vessels and retardation of the blood current in them gives rise to imperfect aëration of the blood, and to respiratory dyspnœa, together with a tendency to hæmoptysis, as the over-distended vessels are apt to give way; and there is also a disposition to congestive bronchial catarrh, with cough and watery or sanguineous expectoration. Thus we see that the first symptoms that are liable to arise as the result of failing compensation are those due to passive pulmonary engorgement: dyspnœa, cough, expectoration, and sometimes hæmoptysis. At the same time the action of the heart becomes feeble, labouring, and irregular, and palpitation is complained of. The strain also makes itself felt on the right cavities of the heart, and the right ventricle yields to its excessive labour, the right auricle becomes over-distended, and the outflow of

blood from the venæ cavæ and the systemic veins is hindered.

The liver and the other abdominal viscera feel this obstruction in the venous current, their vessels become over-filled, and the liver often becomes greatly enlarged. Hindrance to the portal circulation in the liver leads to congestive catarrh of the stomach and intestines, and pressure on the bile ducts by the distended vessels within the liver gives rise to a subicteric staining of the skin, to a diminished discharge of bile into the intestines, and thus to constipation.

Distension of the renal veins and retarded circulation in the renal vessels cause scanty, high-coloured urine, which may contain albumen, casts, and blood-cells.

Evidence of obstruction to the circulation is seen in the superficial veins; they become distended and stand out prominently from the surface, the venules dilate, and the skin becomes cyanotic; general dropsy may then set in, beginning in the feet and ankles and extending upwards, usually affecting also the abdominal cavity, which is especially prone to ascites from the co-existence of obstruction to the portal circulation. Dropsy of the upper extremities and of the other serous cavities may supervene.

These are the chief morbid conditions which follow failure of compensation in mitral disease.

We see, then, that our therapeutic measures must be directed not only to raising the tone of the cardiac muscle, but also to the relief of the visceral congestions and to the removal of dropsical effusions; but it is clear that we cannot carry out the two latter indications unless we also succeed in fulfilling the former.

In cases of **aortic valve** disease, unless the mitral valve be also involved, as is not unfrequently the case, failure of compensation is attended with somewhat different phenomena. Aortic insufficiency, although a more serious affection than the like lesion in the mitral, may through hypertrophy of the left ventricle remain for many years perfectly compen-

sated, and may give rise to no morbid symptom. But when from degenerative changes in the hypertrophied muscle, and a coincident sclerotic condition of the aortic arch and the orifices of the coronary arteries, compensation begins to fail, the following symptoms usually present themselves :—

Owing to the sudden emptying of the vessels of the head and face due to aortic regurgitation, great pallor and thinness of the face are often observed, together with symptoms of cerebral anæmia, headache, dizziness, swimming, and tendencies to faint, especially on any sudden alteration of position, as in getting out of bed, or rising suddenly from a reclining position. Palpitation may arise on the slightest exertion, and **pain** referrible to the cardiac region is especially prone to occur in aortic cases with failing compensation. This pain may be limited to the cardiac region, but more commonly it radiates into the neck and down the arms and into the fingers, especially of the left side. Attacks of **angina pectoris** are frequently associated with this form of valvular lesion.

As failure of compensation progresses, painful attacks of dyspnœa are liable to occur, especially during the night, with orthopnœa. Although general dropsy is rare, some œdema of the feet is common ; so also is pulmonary congestion and œdema with troublesome cough. Death is often sudden, and rarely lingering, as in mitral cases. Symptoms due to embolism, cerebral, splenic, and renal, are frequent, as paralysis, hæmaturia, and splenic enlargement.

As a general rule we may say that when compensation in aortic cases begins seriously to fail it is usually less remediable and more rapidly progressive than in mitrocases.

When mitral insufficiency is developed secondarily to aortic incompetence and stenosis, the series of morbid changes already described as dependent on mitral disease of course arises.

The primary **indication for treatment** in all

these cases of ruptured compensation is to endeavour to restore it by raising the tone of the cardiac muscle, and in many cases, especially those of mitral lesions, we are able to do so again and again. We have already pointed out the importance, in the treatment of cardiac diseases, of *diminishing the mechanical work of the heart.* This is itself sufficient in many cases to restore the broken compensation. **Rest in bed,** with appropriate food, for a week or ten days, will frequently succeed in removing all the evidences of circulatory disturbance in chronic mitral disease. Cardiac irregularity, visceral congestions, dyspnœa, dropsy, will all disappear. Insist, then, as an essential condition to successful treatment, on *physical rest,* rest in the recumbent position, and maintain this rest until you have good reason for believing that a certain amount of compensation has been restored.

But we have at our disposal some very reliable medicinal resources for raising the tone of the cardiac muscle when it begins to fail, and these are the various drugs known as *cardiac tonics,* which we must now pass in review.

Of all cardiac tonics **digitalis** remains the most reliable and trustworthy. Its power of restoring tone to the enfeebled cardiac muscle is remarkable, and is unequalled by any other drug. Under its use the systolic contraction of the ventricles becomes more vigorous, the period of diastole is prolonged, and the pulse, at the same time, becomes slower and more regular as well as stronger. In mitral regurgitation the improved tone of the right ventricle raises the tension in the pulmonary veins and the left auricle, and counteracts the backward flow through the incompetent valve, and the more vigorous and complete contraction of the left ventricle causes a larger quantity of blood to be projected into the arterial system. Digitalis also acts as a tonic to the arteries, stimulating normal contraction of their muscular fibres, and so furthering a steady and continuous flow of blood onwards through the capillaries.

It is this *twofold* tonic action on the forces of the circulation that is so valuable in digitalis, for the tonic contraction of the peripheral vessels* is an important aid to the circulation, and is especially felt in the capillaries and the venous radicles; hence it is that digitalis acts so powerfully in the relief of cardiac dropsies, and often so largely increases the flow of urine. Prof. H. C. Wood has shown how digitalis aids the nutrition of the heart itself: 1st, by completely emptying the vessels of the heart during the sustained and strengthened systolic contractions; and, 2nd, by promoting the more complete filling of its arteries during the prolonged diastole, and at the same time affording the necessary *rest* to the cardiac muscle. Hence the *permanent* improvement following its use.

A few moderate doses of digitalis combined with rest in bed will often reduce the cardiac beat from 120 or 130 to 60 or 70 in the minute.

In the advocacy of substitutes for digitalis, now so common, a great deal is often made of the so-called drawbacks and dangers attending its use. It is said to accumulate in the system, and after a time to produce *sudden* dangerous symptoms. After a long and considerable experience of its use in cardiac disease we have rarely met with such a circumstance. That it occasionally causes gastro-intestinal irritation, especially if administered unskilfully, or in too large doses, or for too long a period, is certain. But with care in its administration—*and all drugs should be administered with care*—and occasional interruptions in its use for two or three days at a time, it will be found that it very rarely disagrees.

In the palpitation not unfrequently encountered in cases of mitral stenosis in women without other signs of failing compensation, digitalis will often produce distressing symptoms, even in small

* Sufficient distinction is not made between the obstruction to the circulation caused by *morbid spasm* of the arterioles, and the *aid* to the circulation which improved tone of their muscle affords.

doses. One patient described its effect as making her feel "as if her heart was grasped in the hand." In such cases, if digitalis is given, the pulse may become small and irregular and the urine scanty. It is now generally admitted that this drug rarely acts well in cases of uncomplicated mitral stenosis. In these cases the *nitrites* are more serviceable.

Some importance must be attached to the choice of a suitable preparation of the drug and to its administration in suitable doses. The preparations usually employed are the powdered leaves, the tincture, and the infusion, and also *digitalin*. The powder is especially prone to cause gastro-intestinal irritation, and should be avoided. Pilules of digitalin will be found useful and convenient in the slighter functional cardiac disturbances, but it has not the diuretic action of digitalis leaves. Of the several digitalines manufactured, the crystalline form of *Nativelle* is the most potent—it is said to consist almost entirely of digitoxin—the dose is from $\frac{1}{250}$th to $\frac{1}{600}$th of a grain. Sansom reports good results from the hypodermic injection of digitalin, in cases where digitalis given by the mouth had failed; he uses Savory and Moore's discs, each containing $\frac{1}{100}$th of a grain—the dose should not exceed two of these.* There remain the tincture and the infusion; the former is a handy and useful preparation, but a great many physicians prefer, and, we think, with good reason, the freshly-prepared infusion. Then as to the best dose. In cases where it is important to establish the diuretic action of the drug as quickly as possible, we should begin with full doses, which we can diminish when full diuresis has been established. Half an ounce of the infusion, or 10 to 15 minims of the tincture, combined with a dram of the spirit of juniper, may be given every six hours until the diuretic action of the drug has been produced.

In cases where there is no dropsy, smaller doses, which may be continued for a considerable

* Allbutt's "System of Medicine," vol. v., p. 990.

period, act better, and we frequently give doses of 5 minims only of the tincture or a dram or two of the infusion three times a day. If there is any tendency to gastric irritation, it is as well to combine with these small doses 20 or 30 minims of the aromatic spirits of ammonia and some aromatic water. When there is great gastric irritability, digitalis has been given by the rectum in the form of small enemata; an ounce of the infusion with 2 ounces of warm water may be thus administered twice or three times a day.

When digitalis fails, it is usually because the cardiac muscle is in an advanced stage of degeneration; then, indeed, it is useless, and its administration should not be continued.

Huchard has pointed out that *children* bear digitalis well because of the integrity of all their organs, but, being a toxic drug, it should be given to them cautiously and in small doses; whereas *old people* bear it badly owing to the probable presence of lesions of the cardiac muscle and of the blood-vessels, as well as of the kidneys and liver; to them it should be given, therefore, also with great caution, especially when there exist obvious signs of *arterio-sclerosis*.

We have already said that this drug is counter-indicated in most cases of mitral *stenosis*, and should only be given with great caution and when there are symptoms of failure of the right ventricle. Broadbent points out that "in mitral stenosis the blood cannot be forced through the constricted mitral orifice beyond a certain rate of speed, and if the right ventricle is stimulated to contract more than is required for this, it encounters an insuperable obstruction and becomes embarrassed in its action, its energy being needlessly expended. A common result is irregularity in the beats, accompanied by a sense of præcordial oppression."* But when the action of the heart is feeble, rapid and fluttering, a few doses of digitalis will often prove of service.

* "Heart Disease" (third edition), p. 134.

Next, perhaps, in value to digitalis as a cardiac tonic we must reckon **strophanthus.** It is a direct stimulant of the cardiac muscle, and not only does it, like digitalis, regulate the cardiac rhythm, slow the pulse, and strengthen and sustain the ventricular systole, but in some cases it also, like digitalis, acts as an efficient diuretic; and, in our own experience, it is often in those cases in which digitalis fails to act as a diuretic that strophanthus succeeds. Complaint has been made of the uncertainty of its action, and it must be admitted that it is not to be so generally relied upon as digitalis, especially in serious failure of compensation. But in cases of cardiac feebleness, associated with corpulency, flatulence, and dyspepsia, or following acute illnesses, we have found it, in some cases, most useful and much better tolerated than digitalis. This drug is also useful as a substitute for digitalis when we think it necessary or desirable to suspend for a time the administration of the latter; and we shall sometimes find that when we have, as it were, exhausted the sensitiveness of the cardiac muscle to digitalis, it is a good plan to resort to strophanthus, and return, after a time, to digitalis. The fact that strophanthus is more entirely a *cardiac* tonic, and does not act on the arterioles like digitalis, seems to point to it as the better drug of the two in gout and other cases in which vascular tension is high from contracted arterioles.

The action of strophanthus is not cumulative like that of digitalis, nor have we found, in small or moderate doses, that it produces, as has been stated, gastric or intestinal irritation. As to the best dose and preparation, we have found from 6 to 10 minims of the tincture every four to six hours answer well.

A most valuable cardiac tonic, the use of which had, until lately, been somewhat neglected in Great Britain, is **caffeine;** and in grave cases of cardiac failure its administration by hypodermic injection,*

* For this purpose, as well as for internal use, caffeine can be dissolved in sodium benzoate or salicylate in the following

especially when from the existence of gastric disorder other cardiac tonics cannot well be given, is often attended with remarkably good results. It is to the modern French school of physicians that we chiefly owe the advocacy of caffeine as a cardiac tonic. Experiments on animals have given rise to the most conflicting opinions as to its action on the heart and circulation. It has been said to quicken and to slow the action of the heart, and to augment and to diminish arterial tension, and we may note somewhat similar results in the use of excessive quantities of coffee in different individuals. In some it will cause very rapid cardiac action; in others it will slow the pulse, and cause cardiac intermissions distinctly sensible to the patient himself. It is to *clinical* experience, therefore, we must refer for guidance in the use of this drug as a cardiac tonic. Dujardin-Beaumetz taught that it is "especially in the last stage of cardiac disease, at the period of *asystole*, and when we have exhausted the effect of other cardiac tonics, that caffeine will be found of signal service." He also maintained that it has often been given in insufficient doses, and that as much as 30 grains a day must be given in order to obtain the best results. Whitla considers its diuretic action more rapid than that of digitalis, and he has "seen excellent results from the administration of 3- to 5-grain doses of the citrate in mitral regurgitation, with much anasarca and congestion of organs, where digitalis was not well borne."

Caffeine may also be usefully combined with digitalis, the combination producing diuretic effects superior to what can be obtained from either given alone. Some prefer the sodio-salicylate of theobromine to caffeine, as having a stronger diuretic action, and not causing nervous agitation and sleeplessness. This is the preparation known as *diuretin*. The dose is 15 grains every four hours.

proportions:—Caffeine, 30 grains; sodium benzoate, 35 grains; distilled water to make 200 minims. An injection of 20 minims will contain 3 grains of caffeine.

Convallaria and the glucoside *convallamarine* have been employed as cardiac tonics, and no doubt they possess the property of augmenting the contractile force of the heart, and so promoting diuresis. They are, however, greatly inferior to the preceding, and their use should be reserved to certain cases in which these do not agree, or where, for some reason, it seems desirable to vary the treatment. A tincture of convallaria is made, of which the dose is 5 to 20 minims, three to six times a day, or convallamarine may be given in half-grain doses twice daily. Sansom thinks it of use in cases of mitral stenosis, when digitalis is counter-indicated. He has found it influence favourably the cardiac irregularity and act as a powerful diuretic.*

Sparteine is another cardiac tonic which has scarcely realised the expectations of its advocates. It is usually given in the form of sulphate, 1 to 2 grains three times a day. It has been said to produce diuresis very rapidly; but, like so many other drugs of this class, its action has been found very uncertain. It has its value, however, in cardiac affections when other resources fail, or as an alternative when it is not desirable to exhaust the effect of some other drug. Some consider the rapidity of its action to especially indicate its use in acute enfeeblement of cardiac tone in acute diseases. A quarter of a grain to a grain may be given three or four times a day. It is the active constituent of infusum scoparii, which may be used as a vehicle for other cardiac tonics.

Adonis vernalis and a glucoside derived from it, *adonidine*, have also been given as cardiac tonics, the latter in doses of $\frac{1}{6}$th to $\frac{1}{3}$rd of a grain; but little reliance can be placed on them.

Cactus grandiflorus is another cardiac tonic recently introduced as possessing the power of regulating and strengthening the cardiac contractions in organic and functional cardiac affections, especially

* Allbutt's "System of Medicine," vol. v., p. 1032.

the latter, but, like the preceding, it appears to be unreliable.

Strychnine, quinine, coca, kola, are all valuable cardiac as well as general tonics, and they find their proper use in cases of cardiac dilatation associated with general muscular and nervous asthenia.

They do not appear to have any direct special action, like digitalis or strophanthus, on the cardiac muscle, but they act rather through their general tonic influence on the nervous centres; they are none the less valuable on that account, and we have found strychnine, quinine, and coca of the very greatest use in the treatment of cases of cardiac asthenia following acute disease; but they cannot take the place of digitalis and its analogues for the purpose of regulating cardiac rhythm and promoting diuresis in grave cases of valvular disease with failure of compensation.

There are few cases of chronic valvular disease, with failing compensation, that will not, at some period in their course, be greatly benefited by the judicious administration of some preparation of **iron.** The milder preparations usually answer best, such as the ammonia citrate, the phosphate, and the tartrate. The attention of medical practitioners has been so strongly directed of late years to other cardiac tonics that the value of ferruginous compounds is in danger of being overlooked, and it is necessary, therefore, to insist on their undoubted value and efficacy.

In mitral cases, accompanied with symptoms of arterial obstruction, as in chronic Bright's disease, it is often advisable to combine with the cardiac tonic, such as digitalis, an arterial relaxant, such as sodium iodide, nitrous ether, nitro-glycerine, or erythrol nitrate.

Finally, we must not omit to refer to the great value of mercurial aperients in the management of these cases. It is always desirable to give a pill of aloes and blue pill, or blue pill and colocynth, before

beginning the use of digitalis. Moreover, such aperient doses must be given frequently, in order to promote elimination, to unload the abdominal veins, to relieve thereby the right heart, and to stimulate hepatic functions.

ADDITIONAL FORMULÆ.

Cardiac tonic powders.

℞ Pulveris digitalis, gr. iij.
Quininæ sulphatis, gr. xviij.
Pulveris rhei, gr. xviij.
Sodii bicarbonatis, gr. xviij.
M. et divide in pulv. x. A powder twice a day.
(*Schnitzler.*)

Cardiac tonic mixture.

℞ Infusi adonis vernalis (made by infusing 60 grains of the leaves in 4 oz. of water), ʒiv.
Spiritus menthæ piperitæ, ♏v.
M. f. mist. A tablespoonful four times a day. (*Schnitzler.*)

Sedative drops to allay cardiac excitement.

℞ Extracti belladonnæ, gr. ij.
Tincturæ digitalis, ʒiij.
Aquæ laurocerasi ad ʒj.
M. f. mist. Ten drops three times a day. (*Schnitzler.*)

Cardiac tonic.

℞ Syrupi floris aurantii, ʒiv.
Infusi convallariæ majalis (made by infusing 2½ drams of the plant in 12 oz. of water) ad ʒvj.
A tablespoonful every two hours. (*Bamberger.*)

Iron and digitalis cardiac tonic.

℞ Tincturæ digitalis, ♏cc.
Tincturæ ferri perchloridi, ʒiijss.
Spiritus chloroformi, ʒiij.
Glycerini puri, ʒj.
Aquæ destillatæ ad ʒiv.
M. f. mist. A teaspoonful in a wineglass of water four times a day, after food. (*Whitla.*)

Caffeine mixture.

℞ Caffeinæ, gr. xvj.
Sodii benzoatis, gr. xvj.
Syrupi floris aurantii, ʒiij.
Aquæ ad ʒiv.
M. f. mist. A tablespoonful for a dose.

CHAPTER III.

THE MANAGEMENT OF SPECIAL SYMPTOMS DEPENDENT ON CHRONIC VALVULAR DISEASE.

SYMPTOMS DUE TO VENOUS ENGORGEMENT—Bleeding—Purgatives—Treatment of Dyspnœa—Bronchial Catarrh and Cough—Hæmoptysis—Dyspeptic Symptoms—Dropsy—Diuretics—Milk Diet—Hydragogue Cathartics—Diaphoretics—Incisions into Subcutaneous Tissue—Multiple Punctures—Paracentesis Abdominis—Massage—Treatment of Restlessness and Insomnia—Caution in Use of Opiates—Codeia—The Bromides—Sulphonal—Paraldehyde—Treatment specially appropriate to *Aortic Lesions*—Food and Regimen—Digitalis and Iron—Consequences of Hypertrophy—Arterial Strain—Anginal Attacks—Symptoms due to Cerebral Anæmia, to Hypertrophy, to Embolism—Value of Rest—Avoidance of Excitement, physical and mental—Food and Stimulants—Gentle Aperients—Digitalis—Treatment of *Attacks of Pain*—Potassium Iodide—Nitro-Glycerine—Opium and Morphine for Dyspnœa and Insomnia. Additional Formulæ.

IN the next place we will consider, in detail, the appropriate treatment of the several morbid conditions which arise in consequence of the break-down in the cardiac mechanism from failure of compensation.

In the first place there are the symptoms referrible chiefly to the pulmonary engorgement—dyspnœa, cough, hæmoptysis; and secondly those due to the over-distension of the right side of the heart, and the systemic and portal veins; cyanosis, gastro-intestinal catarrh, jaundice, albuminuria, and general dropsy.

Now some of these conditions may be relieved by diminishing the volume of blood in the right side of the heart and in the veins, so that their over-distension is lessened, together with the pulmonary engorgement.

We may diminish the volume of blood *directly* by the abstraction of blood by **bleeding**, or *indirectly* by the withdrawal of water from the blood by means of hydragogue purgatives.

If the right ventricle retains a fair amount of contractile power, as evidenced by a forcible right ventricular impulse, the relief of its over-distension by

the abstraction of 6 to 10 ounces of blood is often very remarkable.

The indications for the employment of this measure usually arise only in the ultimate stages of the disease, when the relief afforded may be but temporary, and the struggle for life only prolonged for a brief period.

Bleeding should be reserved for the relief of cases of intense dyspnœa with cyanosis, arising from a great amount of backward pressure and over-distension of the right side of the heart with pulmonary engorgement; it should be immediately followed by cardiac stimulants and tonics, and it should rarely exceed ten ounces at a time. It is chiefly useful in enabling restoratives and tonics to act more efficiently, and it is more likely to answer well in young and robust subjects than in the old and debilitated; in the latter it will rarely prove a judicious expedient. By postponing for a short period the fatal event, it may, however, prove a valuable measure in enabling the patient to transact important business, which would otherwise be left undone.

We may mention a case in point in which the abstraction of a few ounces of blood (4 or 5) led to the most astonishing revival of a cardiac patient who was on the point of death. She was relieved of her breathlessness, and began to eat and drink again with appetite, and to converse cheerfully. Besides aortic obstruction and regurgitation, she had evidences of mitral stenosis and regurgitation, and on post-mortem examination the tricuspid valve was also found to be diseased, and there was immense distension of the right auricle, which the bleeding had relieved. The revival, however, only lasted for about a fortnight.

Sometimes the application of 6 to 10 leeches over the liver in the epigastrium may suitably take the place of venesection.

There are few cases of heart disease, with notable venous obstruction, that are not greatly relieved, at some part of their course, by the administration of suitable **purgatives.**

The unloading of the portal system thus induced tends directly to the removal of the congestion of the liver and the concomitant gastro-intestinal catarrh, and so assists in the assimilation of food, while it indirectly relieves the distension of the right side of the heart, the over-loaded systemic veins, and the pulmonary congestion; ascites and general dropsy may be also greatly diminished, if not completely removed.

The purgative should be given in the early morning, when the stomach is empty, so as to avoid any disturbance of the patient during the night, and to sweep away the *débris* of food *only*, and not to imperil the nutrition of the patient.

We usually select when there is *ascites* either saline purgatives, such as *magnesium sulphate*, or hydragogue cathartics, such as scammony, jalap, gamboge, senna, and elaterium.

A full dose of magnesium sulphate (3 to 6 drams) dissolved in as small a quantity of water as possible, should be given in the morning, fasting.

The *compound jalap powder* of the B.P. is a favourite purgative in these cases; from 30 to 60 grains may be given every morning. The compound scammony powder is also a useful purge. It may be given alone in 15- or 20-grain doses or combined with the compound jalap powder; or we may give 10- or 15-grain doses of a combination of equal parts of the compound colocynth and compound gamboge pill. We should reserve *elaterium* for cases in which the preceding fail, or do not cause a sufficient discharge of fluid from the bowels. It varies a good deal in its activity, and is sometimes very depressing. The compound powder of elaterium may be given in 3-grain doses. A little ether, or sal volatile, or brandy, should be given if much depression attends its action.

In cases where these strong cathartics are not needed or are ill-borne—and it is only in cases complicated with dropsy that they are needed—milder ones

should be resorted to, such as the compound liquorice powder, Carlsbad salts, or colocynth and henbane pills. The cardiac patient should never be allowed to become constipated, as constipation raises the tension in the abdominal vessels, and augments the work of the heart.

As a rule these patients bear purgatives well.

A good and gentle aperient for habitual use in these cases is a pill of a grain of calomel and 5 grains of rhubarb at night, and one or two drams of sodium sulphate in a wineglassful of hot water the morning following.

Other measures may be needed to relieve the **dyspnœa, hæmoptysis,** or **bronchial catarrh,** with cough and expectoration, dependent on the pulmonary congestion. Counter-irritation is here of much service; mustard plasters or turpentine stupes, applied over a large surface of the chest, give much relief; or turpentine embrocations may be rubbed in freely. Dry cupping over the back of the chest is often of great benefit. Blisters are occasionally useful, but we prefer mustard plasters, as they can be often repeated, and do not need troublesome dressings.

When the dyspnœa is due to over-distension of the pulmonary vessels, as it usually is, temporary relief may often be obtained by administration of the nitrites, nitrite of amyl, nitro-glycerine, or sodium nitrite, as they cause a temporary dilation of the vessels of the lungs.

Hæmoptysis, which is especially liable to occur in mitral stenosis, unless it is excessive or dangerously prolonged, does not call for any active interference for its arrest. Its effect must be to unload the pulmonary vessels and to relieve the congestion which has induced it. Osler * mentions a medical man who had many attacks of hæmoptysis in association with mitral incompetence, and whose condition was invariably better after the attack. As, however, the symptom is usually an alarming one to the patient

* "Practice of Medicine," p. 734.

and his friends, they should be told that its effect is sometimes salutary; and at the same time some simple remedies may be prescribed. Perfect repose must, of course, be insisted on, and a few doses of magnesium sulphate, with dilute sulphuric acid and infusion of roses, are useful. Nervous agitation and palpitation must be allayed by some sedative, and for this purpose we may give a dose of $\frac{1}{6}$th or $\frac{1}{4}$th of a grain of morphine with a dram of cherry-laurel water.

In the treatment of the **cough** of cardiac cases we should follow much the same methods as in the treatment of *chronic bronchial catarrh* (see Part III., chap. iii.), but in cardiac cases expectoration may be promoted and the cough relieved by stimulants directed to help the struggling heart, such as ammonium carbonate, with spirits of ether or chloroform, nux vomica, and senega, and, as a drink, hot milk with Apollinaris water (equal parts), and a few teaspoonfuls of whisky or brandy may be given. Stimulating expectorants, combined with *small* doses of opium, have a good effect, such as the ipecacuanha and squill pill of the B.P., 5 grains once or twice a day.

The **gastric** symptoms dependent on congestion of the liver (which is often greatly enlarged) and engorgement of the portal venous system, such as loss of appetite, flatulence, nausea, and vomiting, are often very difficult to relieve.

It is well to begin by giving non-irritating and non-depressing aperients. Half a grain or a grain of calomel with 5 grains of colocynth and henbane pill may be given every night, and 1 or 2 drams of sodium sulphate and $\frac{1}{2}$ a dram of sodium bicarbonate in an ounce or two of hot water the first thing in the morning. For the *nausea* effervescing saline draughts, with an excess of sodium bicarbonate and 5-minim doses of dilute hydrocyanic acid, may be given three or four times a day. Large hot linseed and mustard poultices over the right hypochondriac and the

epigastric regions frequently afford great relief. The flatulence will be relieved by a grain of menthol or thymol or ½ a minim of creasote in a pill twice or three times a day after taking food. Obstinate vomiting will require the suspension of all food except a little iced milk or milk and lime water. Small quantities of iced water, or effervescing drinks, such as iced champagne with Apollinaris water, may be given to allay thirst and to support the patient. Oxalate of cerium in 2- or 3-grain doses, mixed with a little sugar of milk, will sometimes relieve the gastric irritability in these cases after other measures have failed.

Digitalis is usually very badly borne in cases of this kind, but we can sometimes give nux vomica with advantage after the vomiting has been checked. Fifteen to twenty drops of the tincture combined with 10 or 15 grains of sodium bicarbonate should be given three or four times a day when the stomach is empty.

Great care must be observed in feeding these cases of gastric irritability. The food should be fluid or semi-fluid, in small quantity, and pre-digested. Peptonised milk or beef and chicken jelly, or peptonised gruel or cocoa, occasionally a cup of clear soup, all these may be used so as to vary the dietary.

But one of the most urgent symptoms which we have to treat in connection with venous engorgement from failure of compensation is **dropsy**, and we will now consider in detail the best measures to adopt in order to relieve the dropsy of cardiac disease. The use of purgatives for this purpose we have already referred to.

The removal of the serous fluid which has accumulated in the subcutaneous connective tissue, or in the serous cavities, may be effected in various ways: (1) It may be removed by excessive *diuresis* through the agency of the kidneys; (2) it may be drained away from the intestinal vessels by hydragogue cathartics; (3) it may be got rid of, to some extent, by stimu-

lating the cutaneous excretion, by *diaphoretics;* and (4) it may be drained off by direct puncture or incision of the skin and connective tissue, or, if the serous cavities are involved, by puncture and aspiration.

Most of those drugs which we have described as **cardiac tonics** act also as **diuretics.** They raise the blood-pressure in the renal glomeruli by strengthening the cardiac contractions, and while they thus increase the flow of urine, they at the same time tend to *remove the cause* of the dropsical effusions. We usually, therefore, commence the treatment of cardiac dropsy by the attempt to excite excessive diuresis, and for this purpose we administer those drugs which act also as cardiac tonics. The diuretic effect of digitalis is sometimes most remarkable, and it is common to see a considerable amount of general anasarca disappear in a few days with rest in bed and treatment with digitalis. The fresh infusion of the leaves seems to be the preparation which has the most powerful diuretic effect. We should begin by giving a full dose, such as ½ an ounce, three times a day, and diminish the dose as the diuretic effect becomes established. This is a better plan than to lose time by beginning with an inefficient dose and gradually increasing it. The only caution necessary is that it should not be permitted to accumulate in the system, and that it certainly cannot do at the *commencement* of its use. If digitalis fails, strophanthus may be tried in 5- to 10-minim doses of the tincture every three or four hours; this drug will, in certain cases, cause free diuresis after the failure of digitalis. *Caffeine* may next be tried: its diuretic power is often very considerable. It may be given in 3- to 6-grain doses four or five times a day, either by the stomach, dissolved in water with the aid of sodium benzoate, or by hypodermic injection. The other cardiac tonics may be tried if these fail.

It is customary to combine squill with digitalis as forming a more effective diuretic than either singly,

and the addition of blue pill or calomel to a pill containing squill and digitalis has long been a favourite formula. *Calomel* itself acts as a powerful diuretic in some cases of cardiac dropsy, and its employment is indicated when the class of cardiac tonics fail, or to aid them when they prove inefficient. It sometimes acts rapidly; its diuretic action is somewhat difficult *to explain*, but it is probably associated with its action on the liver and intestinal canal. It has been given, in these cases, in doses of 1½ to 3 grains, three or four times a day.* Its use should not be continued after its diuretic effect has been established. It should not be given in advanced cases.

Potassium iodide often proves a serviceable diuretic, alone or in combination with digitalis.

Diuretin (sodium theobromine salicylate) has been advocated as a valuable diuretic in cardiac dropsies. Cases have been published in which its diuretic power has been reported as marvellous; at the same time it is not pretended that it can take the place of digitalis or other cardiac tonics, but rather that it may be used in the place of such a diuretic as calomel and with more safety. It is given in doses of 15 grains every four or five hours. It is said to be a very unstable preparation, and that it readily decomposes, and this fact may account for the conflicting estimates of its value that have been published.

It is often found that a combination of diuretics will answer better than either alone. Some of the most useful of these combinations will be found amongst the formulæ at the end of this chapter.

The effect produced by diuretics will depend on the condition of the heart and the kidneys. If the cardiac muscle is in a state of advanced degeneration, and if the kidneys are also unsound, very little good can be expected of them.

* On the Continent it has been given in very large doses, even to the production of diarrhœa and salivation. It is said that it is only in such large doses that its diuretic effect is produced. We have seen ill effects follow this practice.

When diuretics fail to relieve the dropsy, recourse is had, in the next place, to those *hydragogue cathartics*, the use and application of which we have already described, and it often happens that after a certain amount of the dropsical exudation has been removed by the action of these drugs, diuretics will be found to have recovered their power, and may be re-administered with advantage.

Useful as **diaphoretic** measures prove in the treatment of renal dropsies, they are of little efficacy in the removal of those of cardiac origin, and when diuretics and cathartics fail us we have only one other resource left, viz. to drain away the dropsical fluid by punctures or incisions into the subcutaneous tissue; or, in dropsy of the peritoneum or other serous cavities, to remove the fluid by paracentesis.

These measures are often needed in the last stage of heart disease to relieve the distress of the patient from the enormous swelling of the legs, which may become quite immovable, or from the great accumulation of fluid in the abdominal cavity preventing the descent of the diaphragm. It is remarkable the relief that is afforded by these measures in some cases, and, when accompanied or followed by appropriate tonic and supporting remedies, the patient is occasionally restored for a time to comparative comfort.

There are different methods of effecting this drainage. Some make free **incisions** half an inch to an inch in length through the skin and subcutaneous tissue over each malleolus; the legs are kept in a dependent position, and the patient's body is raised into the sitting or semi-recumbent attitude. Large quantities of fluid will thus be drained away, to the great relief of the patient. Most careful antiseptic precautions must be followed in the performance of this operation; the skin must be cleansed by washing it with soap and then with an antiseptic solution, and after the incisions have been made, the legs must be wrapped in flannel soaked in antiseptic fluid. Without such minute care, and in some cases in spite of

it, owing to the low vitality of the skin, inflammation and sloughing will attack these wounds.

Less risk is thought by some to attach to **multiple punctures**, made with the same antiseptic precautions, either with the point of a bistoury or with a suitable needle, thoroughly cleansed by being passed through the flame of a spirit lamp, and also dipped in antiseptic fluid. The patient should be seated, when practicable, in an easy reclining chair, and his feet placed in a tub containing warm water saturated with boric acid, and from 15 to 20 punctures should be quickly made between the knee and ankle. Fluid will usually flow rapidly from these punctures. The legs should then be enveloped in antiseptic wool or other appropriate antiseptic dressing, which should be maintained in position by a light flannel bandage. Small multiple punctures thus made and carefully treated usually heal readily.

Some recommend the use of what are called "Southey's tubes," small perforated silver canulæ, which are introduced through the skin into the subcutaneous tissue, and attached to a length of fine indiarubber tubing, through which the fluid may be conveyed away into a suitable receptacle. These are intended to avoid the discomfort and trouble attending the continued escape of large quantities of fluid from the patient's legs, especially when he is confined to bed and cannot sit up; but they do not always act so well as multiple punctures.

It will occasionally happen in old cardiac cases that the areolar tissue of the legs has become so indurated that no fluid escapes on puncture, and we must be prepared for a disappointment of this kind.

In some cases of cardiac dropsy a large accumulation of fluid occurs in the peritoneal cavity, embarrassing the respiration and circulation by pressing up the diaphragm, seriously interfering with the renal functions by pressure on the kidneys, and, by compressing the abdominal veins, further retarding the return of blood from the lower extremities. In these

cases of *cardiac ascites*, when other measures, such as we have described, fail to make any impression on the amount of fluid, and serious consequences threaten from the pressure it is causing on surrounding parts, *paracentesis abdominis* should be performed for the removal of at least a portion of the fluid; firm pressure should also be applied to the external surface of the abdomen by a flannel binder both during and after the withdrawal of the fluid. If such pressure is properly applied and maintained there will be little risk of syncope. Some diffusible stimulant should be given to the patient before the operation. It will often be found that when the pressure of the ascitic fluid is removed from the kidneys and the abdominal veins the action of diuretics and purgatives may be re-established, to the great advantage of the patient.

Passive effusions into one or other pleural cavity (*hydro-thorax*), when of sufficient amount to interfere seriously with respiration, must be removed, at any rate in part, by puncture and aspiration.

Massage has been applied successfully to relieve the œdema of the extremities, and also the ascites of cardiac disease when not too far advanced. The tendency to stasis in the venous capillaries is remedied to some extent, and the return of venous circulation promoted by suitable manual compression and stroking of the surface as in massage. Massage of the extremities may be accompanied by abdominal massage "and percussion and strong stroking over the kidneys"; diuresis may be thus established, and the œdema of the feet and legs, in the early stages, may often be caused to disappear; but less effect is observed to follow when there is much ascitic fluid in the abdominal cavity, doubtless because in these cases the cardiac failure is more serious, and the lesion less remediable.

The **cerebral congestion** dependent on venous stasis in advanced *mitral* disease may be attended with various unpleasant symptoms, none, however, more distressing to the patient than the restlessness

and *insomnia* it sometimes induces. There is much difference of opinion as to the propriety of administering opium or morphine in these cases. In *aortic* cases, to the treatment of which we shall presently refer, where there is *cerebral anæmia*, opium is a far more suitable remedy for cardiac sleeplessness than in mitral cases, with cerebral venous congestion.

But whenever the cardiac muscle is thin and weak there is danger in the use of opium. It is true it answers well with some persons, who are not very sensitive to its depressing after-effect, but in others we must not be surprised if we find the use of opium has simply promoted euthanasia. If we are compelled to have recourse to morphine, as is sometimes the case, we should give it in small doses, not more than the $\frac{1}{8}$th or $\frac{1}{6}$th of a grain at a time, and combine it with some stimulant such as the aromatic spirits of ammonia and the spirits of ether. Others are less reserved in their use of opium in cardiac cases. In mitral cases congestion of the liver and defective bile secretion are almost always present, and the latter is always aggravated by opium.

If there should also be some renal complication, opium is still more dangerous. The safe use of opium in cardiac disease requires, in our opinion, the greatest skill and discrimination. We especially object to the *hypodermic* use of morphine in these cases on account of the rapidity with which the drug is then absorbed. We prefer to give it by the stomach, if at all, and combined with a cardiac stimulant, or as a suppository. Broadbent, while praising the comforting effects of a hypodermic injection of morphine in some cases of aortic incompetency, admits the risk attending it. "Occasionally," he says, "a patient, after a good night's rest procured in this way, will say he feels better, sit up in bed, and suddenly fall back dead."* *Codeia*, in quite small doses, answers well in some cases. In a case of combined aortic and mitral disease, under our care, it never failed to procure

* "Heart Disease" (third edition), p. 171.

sleep during the last two years of the patient's life. *Chloral* is a most unsafe drug on account of the cardiac depression it causes.

Sodium bromide is one of the safest remedies for the insomnia of mitral cases. We have often found a combination of 20 grains of sodium bromide and a dram of tincture of hops in an ounce of chloroform water answer well as a hypnotic in these cases. *Urethane* we have found a very uncertain hypnotic. *Sulphonal*, however, is useful, but it acts slowly, and it is best to give it about an hour before the last meal of the day in order to obtain its hypnotic effect during the night. *Paraldehyde* may also be used.

Hitherto we have been considering chiefly the treatment of *mitral* lesions and the circulatory disturbances they involve. It will be convenient now to examine the treatment adapted to the effects of *aortic* lesions which have not yet led to secondary insufficiency of the mitral, for in the latter case the preceding considerations would be as applicable as to cases which were primarily mitral.

Aortic stenosis without insufficiency is the least serious of all valvular affections. The induration of the valves upon which it depends is usually associated with general arterio-sclerosis, and not on endocarditis, and it is, therefore, commonly a disease of advanced age. When the obstruction is but slight it is usually completely compensated by a small amount of ventricular hypertrophy, and the patient may be for many years free from any subjective symptoms and unconscious of the existence of any valvular lesion. When this is the case no active treatment is necessary, or only such as may be required by any co-existing general arterio-sclerosis, or gouty or other blood states.

If, on the other hand, the stenosis is considerable, and imperfectly compensated by the ventricular hypertrophy, symptoms dependent on scanty filling of the arteries arise, such as pallor of the face, a tendency to syncope, giddiness, loss of memory,

disturbances of vision and hearing, and other signs of cerebral anæmia.

The indication for **treatment** in these cases is to maintain or improve the nutrition of the cardiac muscle and to prevent degenerative changes and secondary dilatation; therefore the most suitable treatment for this state is mainly regiminal. Regular gentle exercise may be permitted, but all physical and mental exertion or excitement should be guarded against. Complete physical repose may at times be beneficial. Being much in the open air when the weather is propitious is advantageous for its tonic, restorative, oxygenating influence. The diet should be nutritious, but it should be carefully adapted to the digestive capacities of the patient. When a diet largely composed of milk is well borne and agreeable to the patient, it should be recommended. Animal food, fish, and game in moderation may, however, suit other cases better. Purées of vegetables are most useful for the avoidance of constipation, and a small quantity of sound wine, or spirits and water, may be prescribed with advantage, especially for the aged.

If with other signs of imperfect compensation we observe increased rapidity of cardiac action, with a small, quick pulse of low tension, indicating that the ventricular systole is too brief for the ventricle to completely discharge its contents through the stenosed orifice, and symptoms of backward pressure arise, we should give digitalis in small doses—5 to 10 minims of the tincture three times a day, and we may often usefully combine with the digitalis small doses of iron, such as 5 grains of the ammonio-citrate.

But, as a general rule, digitalis is not indicated in cases of aortic stenosis. Palpitation in these cases may be relieved by the use of nitro-glycerine or sodium nitrite, which lessens peripheral obstruction.

If there is reason to think that the valves have been injured by chronic inflammatory processes of syphilitic origin, full doses of potassium iodide may be indicated and are of great service.

Aortic insufficiency is, perhaps, the most serious of all valvular lesions. The seriousness of the lesion is, however, dependent on the amount of regurgitation which the incompetent valves allow of during the ventricular diastole. It is almost invariably accompanied by considerable ventricular hypertrophy, and when this form of valvular disease occurs in the young and vigorous, the extent of the hypertrophy may be taken as an index of the amount of the regurgitation. Aortic insufficiency necessarily causes the left ventricle to receive two currents of blood during its diastole, one proceeding from the left auricle—a direct current—the other from the imperfectly-closed aortic orifice—a backward current. If this back-flow be but small in amount, the contents of the left ventricle will be but slightly augmented, and its consequent dilatation and hypertrophy will be inconsiderable; but if the backward (regurgitant) current be large in amount, the contents of the left ventricle will be greatly increased, and its consequent dilatation and hypertrophy will be very considerable. So we may generally conclude that an enormously hypertrophied heart associated with the signs of aortic insufficiency point to a large regurgitant current through the incompetent valves. This great dilatation of the left ventricle may lead to the development of secondary mitral insufficiency, and thus we shall have the same series of morbid changes, on failure of compensation, which we have already traced. But we are now dealing with those cases of aortic insufficiency in which the mitral valve remains competent. Owing to the enormous dilatation and hypertrophy of the ventricle which occurs in many cases of aortic insufficiency a very greatly increased volume of blood is discharged, with greatly increased force, into the aorta and the arterial system at each ventricular systole. This produces a certain constantly-recurring strain on the arterial walls, leading to chronic inflammation and induration of their coats, and, in the case of the aorta, often to great dilatation.

The occurrence of *anginal* symptoms, or *pain* in the cardiac region, is a common incident in these cases, a subject to which we shall have to refer hereafter.

A great amount of regurgitation through the aortic valves must necessarily affect the cerebral circulation, the sudden emptying of the large vessels which convey blood to the brain, from the reflux through the incompetent aortic valves, leads to symptoms dependent on cerebral anæmia; sustained intellectual effort becomes difficult, and great irritability of temper is often noticed. Any sudden change of position, especially from the recumbent to the erect position, is apt to be attended with giddiness or even fainting, and sudden fatal syncope is not uncommon. Certain symptoms may be caused by the concomitant cardiac hypertrophy, such as headache, dizziness, disturbance of vision, or even paralysis from cerebral hæmorrhage. Symptoms due to embolism are also especially prone to occur in advanced stages of aortic disease. Emboli may be carried into the cerebral vessels or into those of the spleen, liver, or kidneys. Against some of the symptoms which may arise from failure of compensation in aortic valve disease we have no remedies; but for others, and especially for those dependent on cerebral anæmia, we may do much by judicious management. Rest in the recumbent position and the avoidance of all physical and mental excitement are of great value. Supporting food and a moderate amount of alcoholic stimulants are necessary. At the same time the bowels should be kept regularly relieved by gentle aperients.

We must bear in mind the risk of sudden death in these cases, and caution such patients against all hurry and over-exertion; and we should insist on periods of complete repose in the recumbent posture from time to time. It is most striking the improvement that follows a few weeks of complete rest in some of these cases.

Some differences of opinion exist as to the propriety of giving digitalis in cases of aortic regur-

gitation with failing compensation. It has been urged in opposition to its use that by prolonging the diastolic period such a fall in blood pressure may be induced as to incur the danger of fatal syncope. But we believe the true test of the value of digitalis in these cases is the state of integrity of the cardiac muscle; if it is the seat of advanced degenerative changes (and this is not inconsistent with enormous increase in size), then digitalis will be of little use; but if the cardiac muscle is fairly sound, and in a condition to respond to the tonic effect of digitalis, we believe that the sustained systolic contractions promoted by the judicious and cautious use of this drug will far more than compensate for the prolonged diastole, provided always that the patient is kept in the recumbent position in bed, and the pulse carefully watched, so that the heart's action is not allowed to be too much slowed. Moreover, it must be borne in mind that a *flabby* muscle will offer no resistance to over-distension from a considerable back-flow, but, on the other hand, a fairly sound ventricular muscle contracting vigorously under the tonic influence of digitalis, and better nourished by improved intracardiac sanguification thus induced, is much less likely to yield to the distending effect of the arterial reflux than a flabby muscle with no such sustaining help, and therefore the emptying of the arteries would be greater in the latter than in the former case. And, further, these considerations are consistent with clinical observation. In subjects of aortic regurgitation attacked with palpitation from failing heart power, we have seen the most striking improvement follow the regulating effect of a few doses of digitalis, together with recumbency. Ten minims of the tincture, with 30 minims of aromatic spirits of ammonia and 20 minims of spirits of ether or chloroform, may be given every five or six hours.

The **nitrites** are very useful in allaying palpitation and pain in these cases, but their influence is very temporary, and the doses have often to be rapidly increased to produce any beneficial effect.

Prof. W. H. Thomson strongly advocates the combination of **nitro-glycerine** with digitalis in these cases for the purpose of correcting the contracting effect of the latter drug on the arterioles, and with these two he combines strychnine and nux vomica. His prescription is 10 minims of tincture of digitalis, 10 minims of tincture of nux vomica, and $\frac{1}{100}$th grain of nitro-glycerine for a dose.*

Dr. Barrs, of Leeds, writing on this subject,† very justly observes that the objection to the use of digitalis in aortic disease is rather the consequence of the *à priori* teaching of pharmacology than the outcome of clinical experience, and he expresses his strong conviction, the result of a "fairly large experience,' that, given in sufficient doses, "digitalis is just as much a remedy for aortic as it is for mitral disease."

For Dr. Balfour's elaborate argument in favour of the use of digitalis in aortic disease we must refer to a paper he published some years ago on the subject,‡ but we may quote his conclusion. "When," he says, "from any cause compensation is ruptured, an aortic heart will be found as amenable to the beneficial influence of digitalis as any other failing heart, but larger doses are required; but little influence is produced by less than three times as much as would suffice for a mitral heart. Even should the pulse under treatment become abnormally slow, which is not at all usual, and certainly not needful to secure benefit, we may rest assured that excessive regurgitation is not then promoted, and though sudden death is not at all unlikely to happen, in a badly compensated aortic heart, whether it is treated with digitalis or not, digitalis is never to blame for this. On the contrary, the judicious use of digitalis is the most efficacious treatment in all cases of failing heart, whether that failure be accompanied by aortic or mitral

* Hare's "System of Practical Therapeutics," vol. ii., p. 335 (second edition), 1901.

† *Brit. Med. Journal*, March 12th, 1892.

‡ *Brit. Med. Journal*, June 4th, 1892.

regurgitation. In failure dependent on arterio-sclerosis alone, the tonic influence of digitalis on the heart is hindered, unless we combine with it some drug which unlocks the arterioles, and so prevents an increase of blood-pressure, already abnormally high." We would only repeat that the dose of digitalis should be carefully watched. When we have brought the pulse down to 60 or 70, the dose should be diminished, and when giving larger doses we should keep the patient *recumbent* in bed, for there is much more danger in greatly prolonging the diastole when the patient is in the upright position, with excessive regurgitation, owing to the risk of completely emptying the cerebral vessels.

Broadbent considers digitalis valuable in aortic regurgitant disease when symptoms of mitral incompetence are added to the physical signs of aortic regurgitation, *i.e.* distended pulsating jugular veins, liver enlargement, and dropsy. But he thinks it is rarely of service in the absence of mitral symptoms, and may do harm by setting up vomiting and thus cause serious asthenia.* Douglas Powell agrees in the main with Balfour, and argues that when the early symptoms of heart failure occur in aortic regurgitation, "by the timely employment of an occasional course of digitalis the more desperate symptoms may be long postponed."†

It is certain that great discrimination and judgment are required for the right use of digitalis in cases of aortic regurgitation.

For the relief of the attacks of paroxysmal **pain**, often of a truly anginal character, which frequently occur in aortic cases, we shall require to have recourse to various remedies. Potassium iodide in full doses, 10 grains three times a day, is often very efficacious in the relief of this symptom. *Nitro-glycerine*, of the effects of which we shall speak more fully when considering the treatment of angina pectoris, may also in

* "Heart Disease" (third edition), p. 172.

† "Treatment of Diseases and Disorders of the Heart," p. 66

many cases be given with benefit. We have given sodium nitrate in grain doses combined with sodium iodide in 3-grain doses thrice a day, with great temporary relief in such cases. If the pain resembles that of aortic aneurism, the abstraction of 4 to 6 oz. of blood has sometimes been found effectual in relieving it.

But for the relief of this symptom, as well as the **dyspnœa** and nocturnal **sleeplessness** of aortic insufficiency, we shall often be obliged to have recourse to the preparations of opium or morphine; and in order to avoid as much as possible their remote depressing effects it is well to combine them with ammonia and ether. There is not the same objection to the use of opium in these aortic cases as in those of mitral disease, with pulmonary engorgement and dropsy, as we have already pointed out. Many authors maintain that opium increases the amount of blood circulating in the brain, and therefore relieves the cerebral anæmia. But we believe the beneficial action of opium in these cases to be chiefly due to its sedative, regulating effect on the excited cardiac muscle. It steadies the heart, and enables it to do its work more effectively, and it removes cardiac and cerebro-spinal hyperæsthesia. In this way, no doubt, it may *indirectly* improve the cerebral nutrition. It is well to use small doses at first, and to administer some alcoholic stimulant at the same time. If we give it by the mouth—and we prefer that to the hypodermic method in cardiac diseases—it is desirable that the stomach should contain little or no food, so that stomach digestion is not interfered with. We may give occasionally a draught containing 20 minims of liquor morphinæ hydrochloridi, or 10 minims of the liquor opii sedativus, with 20 minims of spiritus ætheris comp., in an ounce of peppermint water.

Our objection to the *hypodermic* use of morphine in chronic valvular disease is founded on the knowledge of serious conditions of cardiac failure which we have occasionally seen follow this method of giving it—

owing, we believe, to its very rapid absorption when thus administered—but we have not seen these serious results follow when it is given by the mouth combined with a stimulant.

It must be borne in mind that it is never safe to give even small doses of opium or morphine when there are evidences of renal changes, or of advanced degeneration of the cardiac muscle. At all times we prefer *codeia*, if it proves efficacious, and it should be tried before we have recourse to morphine. Some give 20-grain doses of chloralamide, and others have recommended tincture of henbane in hot brandy and water. Attacks of cardiac asthma from aortic incompetence are often relieved by alcohol; strychnine in combination with sal volatile and Hoffman's anodyne has also been found of value in the same cases. The ordinary ether and ammonia mixture is useful but evanescent, so is the inhalation of chloroform.

It must be admitted that the introduction of the *nitrites* into cardiac therapeutics has been a great aid in the treatment of this class of cases; for although they have the disadvantage of soon losing their effect if given constantly, for occasional and temporary use they are of great value. In most cases of paroxysmal cardiac dyspnœa their influence will prove beneficial, as well as in cases of paroxysmal attacks of pain of cardio-vascular origin. But the point to bear in mind is that they are only of temporary value; they may act at times as useful auxiliaries to cardiac tonics, but if administered continuously for long periods they tend to act as cardiac depressants.

ADDITIONAL FORMULÆ.

In aortic incompetence, with congestion and œdema of lungs and bronchial catarrh.

℞ Ammonii carbonatis, ʒj.
Tincturæ hyoscyami, ʒiv.
Potassii iodidi, ʒj.
Tincturæ digitalis, ♏lxxv.
Infusi calumbæ ad ℥vj.
M. f. mist. A tablespoonful every four hours. (*Balfour.*)

For pain in chronic valvular disease.

℞ Tincturæ digitalis, ʒiij.
Potassii iodidi. ʒiij.
Extracti cocæ liquidi, ʒij.
Spiritus ætheris nitrosi, ʒj.
Aquæ et glycerini ad ʒiv.
M. f. mist. A teaspoonful in two tablespoonfuls of water four times a day after food.
(*Whitla.*)

Diuretic mixture in heart disease.

℞ Potassii iodidi, ʒjss.
Spiritus ammoniæ aromatici, ʒiv.
Succus scoparii, ℥jss.
Tincturæ digitalis, ʒijss.
Infusi senegæ ad ℥vj.
M. f. mist. A tablespoonful in water every six hours.
(*Whitla.*)

Cardiac stimulant and diuretic combined.

℞ Potassii acetatis, gr. xx.
Tincturæ digitalis, ♏xijss.
Tincturæ scillæ, ♏xl.
Liquoris strychninæ hydrochloridi, ♏iv.
Infusi senegæ, ad ℥j.
M. f. haustus. To be taken every four hours. (*Bruce.*)

For mitral disease, with bronchial catarrh and dropsy.

℞ Tincturæ scillæ, ʒiv.
Tincturæ digitalis, ʒijss.
Aquæ cassiæ, ad ℥vj.
M. f. mist. A tablespoonful every four hours. (*Balfour.*)

Diuretic calomel powders.

℞ Hydrargyri subchloridi, gr. iij.
Extracti opii pulveris, gr. ½ ad ¾.
Sacchari albi, gr. v.
M. f. pulv. To be taken three times a day for three days; then suppressed for three or four days, and renewed, if well borne. (Use a chlorate of potash gargle at same time.)
(*Bamberger.*)

For bronchial catarrh of cardiac origin.

℞ Quininæ sulphatis, gr. viij.
Acidi benzoici, gr. iij.
Sacchari albi, gr. lxxv.
M. et divide in pulv. vj. A powder every two hours.
(*Bamberger.*)

Cardiac tonic.

℞ Tincturæ digitalis, ♏vj.
Tincturæ ferri perchloridi, ♏xij.
Acidi phosphorici diluti, ♏xv.
Aquæ, ad ℥i.
M. f. haust. To be taken three times a day immediately after meals. (*Bruce.*)

CHAPTER IV.

THE TREATMENT OF CARDIAC HYPERTROPHY AND DILATATION; AND OF DEGENERATIONS OF THE MYOCARDIUM.

Primary Cardiac Hypertrophy rare—Causes—Symptoms—*Treatment*—Regiminal and Dietetic—The "Grape Cure" and "Whey Cure"—Usefulness of mild Aperients—Digitalis to be avoided—Aconite and Veratrium viride—*Simple Dilatation and Cardiac Strain*—Causes—Excessive Physical Exertion—Malnutrition—Exhaustion of Acute Disease—Tobacco—Anæmia—*Symptoms*—*Treatment*—Rest—Sea Voyage—Hydrotherapy—Open-air Life—Nutritious Diet—Suppression of Tobacco—Cardiac Tonics—Formulæ—Importance of Rest and careful Feeding in advanced Cases—Milk Diet—Advantage of Aperients—Formulæ.

DEGENERATIONS: Fibroid Degeneration—Fatty Degeneration—Causes—Symptoms—*Treatment*—Digitalis—Rest—Food—Stimulants—Strychnine—Formulæ—Free Aëration—Iron—Aperients—Sedatives for Restlessness and Insomnia—*Fatty Overgrowth:* Causes—*Treatment*—Dietetic—Mineral Waters—Exercise—*Oertel's Cure*—Additional Formulæ—The "Schott" Movements or Exercises—Artificial Nauheim Baths.

WE must next refer briefly to the treatment of certain chronic changes in the walls of the heart, occurring independently of any valvular lesion, such as **hypertrophy, dilatation,** and **degenerations.**

Hypertrophy of the heart, independent of some obstruction in the course of the circulation, is a comparatively rare affection. As we encounter it clinically it is usually a consequence either of valvular disease or of some obstruction in the peripheral vessels, such as general arterial sclerosis, and this may be caused either by changes originating primarily in the walls of the vessels, or may be secondary to some morbid state of the blood, as in syphilis, gout, and chronic Bright's disease.

But cardiac hypertrophy does occasionally occur as a primary disease, and it is then usually caused by agencies which excite the heart to over-action.

Nervous excitement may do this, by causing habitually increased cardiac action. The excessive use of tea, coffee, alcohol, and tobacco, and habitual excess in eating and drinking generally, and sexual excesses, lead to cardiac hypertrophy from over-action. Excessive muscular exertion, as in rowing, climbing, and other athletic sports and exercises, or in certain laborious occupations, has a two-fold influence in exciting cardiac hypertrophy; first, by increasing the action of the heart and causing palpitation, a condition which in some cases continues after the exciting cause has been removed; and secondly, by the obstruction to the peripheral circulation and heightened blood-pressure caused by undue compression of the small arteries and capillaries during the excessive and sustained muscular contractions.

It must be borne in mind that while muscular compression of the blood-vessels by increasing the blood-pressure excites cardiac hypertrophy, this hypertrophy itself tends to still further increase the arterial tension, and the blood-vessels exposed to this additional strain become the seat of chronic inflammatory changes, so that cardiac hypertrophy, besides being a consequence, is also a cause of arterio-sclerosis.

When cardiac hypertrophy is simply compensatory, as in certain valvular lesions, no subjective symptoms arise as a consequence of the hypertrophy, and no treatment need be directed to it; but when hypertrophy results from abnormal morbid excitement of the cardiac action, then certain characteristic symptoms may arise and call for treatment. Palpitation is one of these, flushing of the face, spots before the eyes, noises in the ears, headache, giddiness, these and other symptoms are dependent on overfilling of the cerebral vessels, and this may, in certain rare cases, lead to cerebral hæmorrhage and apoplexy.

The **treatment** of simple cardiac hypertrophy

of this form is chiefly regiminal and dietetic. All causes of excitement must be removed. Athletic exercises and laborious occupations must be stopped. A wholesome out-of-door life, with strictly moderate and tranquil exercise and much rest in the horizontal or semi-horizontal position, should be enjoined. Daily cold affusions or sprinkling, especially to the head and spine, are useful as calmatives, and good results have been observed to follow the application of a vessel filled with ice-cold water over the cardiac region.

The strictest moderation in diet must be enforced. Animal food should be taken only in small quantities, and fresh vegetables, well cooked, should enter largely into the daily dietary. All alcoholic stimulants should be prohibited, as well as the use of tea, coffee, and tobacco. The amount of fluid consumed should not be great, and should be confined to the wants of the system, as it is undesirable to over-distend the blood-vessels with fluid. Ripe cooling fruits may, however, be permitted. The "grape cure" has been advocated in these conditions, but when large quantities of grapes are consumed daily other food must be restricted to within very narrow limits. The "whey cure" has also been found useful. We must watch that the diet prescribed be readily and easily digested, and if it cause flatulent distension it must be suitably modified. If there is any tendency to abdominal plethora, free daily evacuation of the bowels will be a necessary measure in order to remove pressure from the abdominal vessels. A mild aloetic pill at night and a teaspoonful of Carlsbad or Homburg salts the following morning, in half a tumblerful of cold water, will usually accomplish this result.

We must be careful not to give digitalis to check the palpitation of simple cardiac hypertrophy.

Small doses of aconite and of veratrium viride have been advocated to diminish blood-pressure, and to act as cardiac sedatives in these cases, but we have never seen the necessity of drug treatment of this

kind in cases of cardiac hypertrophy, and we should much prefer relying on such general measures as have already been indicated.

We must next consider the treatment of **dilatation** of the heart, unconnected with valvular lesions. The extreme forms of cardiac dilatation are attended by much the same symptoms as accompany chronic valvular disease when compensation has completely broken down, and they, naturally, require the same treatment. In this section we are considering chiefly the treatment of moderate degrees of dilatation, instances of which have of late years been very frequent. The most common cause of simple *dilatation* of the heart is *diminished resistance* in its walls from impairment of muscular power. This state is a common sequel of exhausting diseases, as the infective fevers, influenza, or of any condition which has lowered the general nutrition, as anæmia, hæmorrhages, privation, etc. It is apt to follow pericardial adhesions, and the changes in the cardiac muscle which accompany acute endorcarditis and pericarditis.

It may also arise from *increased pressure* within the cavities of the heart from habitual high arterial tension, but in that case the dilatation is rarely simple; it is then usually accompanied by hypertrophy, unless the increased pressure should be associated with diminished resistance, and then the dilatation will be simple and rapid, as happens when severe muscular exertion is attempted by persons in weak or failing health, or as in overworked men of middle age, who try to "walk themselves into condition" during an autumn holiday, when their condition is one really requiring prolonged physical rest.

The same may be observed in feeble youths who attempt to emulate the physical exploits of their stronger comrades. In the working classes excessive labour, with insufficient food, may lead to similar results.

In all such cases increased pressure within the heart

is associated with diminished resistance in its muscular walls. Attacks of influenza are especially prone to be followed by cardiac dilatation. Dilatation and symptoms of "**cardiac strain**" are also observed, not unfrequently, both in youth and middle age, from the abuse of tobacco. Young men, in apparently good health, and in active exercise, will occasionally, and somewhat unaccountably, suffer from attacks of palpitation and faintness, and on examination the physical signs of cardiac dilatation will be found. Such a condition is sometimes found associated with habits of sexual excess or masturbation, or simply from an amount of physical exertion in excess of their powers; but in cases where none of these causes exists we shall often be able to trace the cardiac dilatation either to the *excessive use* of tobacco or to its *persistent use* by young men who are constitutionally sensitive to its depressing effects. In middle-aged men, after smoking for 20 or 30 years without obvious ill-effect, it will not seldom happen that symptoms of cardiac dilatation appear somewhat suddenly, and it may be difficult to convince them at first that it is due to the tobacco which they have used so long with impunity.

Anæmia, nervous excitement, anxiety, faulty habits of life, especially with respect to food and exercise, are common causes of cardiac asthenia and dilatation in women, and less frequently, also, in men. Indeed, whatever leads to defective nutrition of the cardiac muscle must predispose to dilatation.

Dilatation, accompanied with more or less hypertrophy, is often observed as a result of the over-exertion attending certain occupations, as in soldiers after forced marches or from excessive drill, and in miners and others engaged in very laborious occupations.

Broadbent enumerates amongst the causes of cases of cardiac dilatation coming under his own observation "injudicious hydropathic treatment," certain methods (Banting's) of reducing obesity, and the

inhalations of Himrod's powder for the relief of asthma.*

It must be remembered that in all cases of dilatation unattended by hypertrophy the ventricles fail to expel the whole of their contents, and in advanced cases only a small proportion of the blood contained in the ventricles is driven into the great vessels at each ventricular systole.

The chief **symptoms** of cardiac dilatation and asthenia are recurrent attacks of palpitation and irregular action of the heart, on any exertion; they often also occur at night, causing the patient to awake from sleep in much alarm. Dyspnœa on walking up hill or ascending stairs, or on making any muscular effort, is also common. In females complaint of cardiac *pain* is frequent, and on deep pressure over the cardiac apex with the point of the finger some hypersensitiveness of the cardiac muscle can often be made out. Liability to fatigue on slight exertion, with languor and feebleness, both physical and mental, accompany most cases. The pulse is usually quick, compressible, and often irregular. The irregular and insufficient supply of blood to the brain gives rise to lack of mental energy, failure of memory and attention, irritability of temper, and a tendency to attacks of giddiness and faintness.

The **treatment** of these forms of cardiac dilatation must, in the first place, consist in the withdrawal of the patient from the influence of all those conditions which have caused it. In those cases in which overexertion has led to cardiac strain we must insist on the avoidance of all kinds of muscular effort, gentle exercise alone being permitted, and this restriction must be enforced for an adequate length of time. When this condition has been induced by over-excitement, emotional or mental, or by addiction to evil habits, these causes must be sought out and corrected. An open-air life in the country or at the seaside, a proper amount of regular exercise, always stopping

* "Heart Disease" (third edition), p. 274.

short of fatigue, a nourishing but light and digestible diet, regular attention to the bowels, and early retirement to rest, are remedial measures too obvious to need insisting upon. When the disease can be traced to the use of tobacco, or is aggravated by it, this must be wholly forbidden, and the rapid improvement in health which usually follows the relinquishment of this habit will rarely fail to reconcile the patient to the sacrifice.

Some **cardiac tonic** will generally be advisable, and will, indeed, be indispensable in those forms of cardiac dilatation and feebleness which occasionally follow attacks of acute febrile and septic maladies, and also in anæmic cases. It will rarely, however, in mild cases, be necessary to have recourse to digitalis except where there is much dyspnœa and troublesome palpitation. In such cases small doses of digitalis may be given in combination with iron, such as :—

℞ Ferri et ammonii citratis	...	...	gr. lxxx.
Tincturæ digitalis	...	...	♏ l.
Spiritus ammoniæ aromatici	...	...	ʒij.
Infusi calumbæ	...	...	ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls twice a day, an hour after meals.

We, however, prefer, in the less serious forms, to employ strophanthus, or strychnine, or nux vomica, with coca, in combination with iron, quinine, or arsenic, as may seem desirable. We have found one or other of the following formulæ very serviceable :—

℞ Quininæ sulphatis	...	...	gr. xvj.
Tincturæ nucis vomicæ	...	...	ʒv.
(*Vel* tincturæ strophanthi	...	...	♏x.)
Extracti cocæ fluidi	...	...	ʒiv.
Spiritus chloroformi	...	...	♏lxxx.
Aquæ		...	ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls twice a day, an hour before food.

Or,

℞ Ferri et quininæ citratis gr. lxxx.
Liquoris strychninæ ♏ xxxij.
Spiritus chloroformi ♏ lxxx.
Aquæ ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls twice a day, two hours after food.

Or,

℞ Ferri arsenatis gr. iv.
Quininæ valerianatis } āā gr. xxiv.
Extracti nucis vomicæ }

Misce et divide in pilulas xxiv. One three times a day after food.

In purely anæmic cases iron and nux vomica, together with some aperient to ensure a regular action of the bowels, will be most serviceable, as:—

℞ Ferri sulphatis exsiccatæ gr. xxxvj.
Saponis gr. xviij.
Pulveris nucis vomicæ gr. xxiv.
Aloin gr. iv.

Misce et divide in pilulas xxiv. One or two (as necessary) twice daily, after lunch and dinner.

In cases of somewhat acute dilatation, however induced, the hypodermic injection of strychnine in doses of $\frac{1}{60}$th to $\frac{1}{20}$th of a grain will sometimes be attended with remarkably good results.

So far we have been only considering the milder forms and moderate degrees of cardiac dilatation, but in extreme cases the same series of morbid phenomena indicative of cardiac failure will be encountered as we have already described in non-compensated valvular disease, and the same treatment will be needed. But in these grave instances of cardiac dilatation the ventricular muscle will usually be found to be in a state of advanced degeneration, and digitalis and other cardiac tonics will usually fail in producing any restorative or strengthening effect on it. Our chief resource in such a case must be the **most absolute repose,** with careful attention to

the general nutrition. Light, easily digested, or predigested, highly nutritious food must be prescribed —such as pounded meat very lightly cooked, beaten-up eggs, chicken and game panada, a little white fish when agreeable, milk, and a small quantity of good sound wine, or a little weak brandy or whisky and water, but the total amount of fluid taken must be strictly limited so as not to augment the volume of blood. A regular action of the bowels must be maintained by suitable aperients.

Free action of the bowels is very advantageous in nearly all cases of cardiac dilatation and feebleness, as we have previously explained. Aperients should, however, be so given as to clear away only the residue of digestion. For this purpose the best method is to give an aloetic pill after dinner or at bed-time and a saline dose early in the morning, about an hour before breakfast. Careful attention must, of course, be given to the individual sensitiveness to aperient medicines. The following will be found applicable to most cases:—

℞ Extracti aloes gr. xij ad xxiv.
Ipecacuanhæ pulveris gr. vj.
Saponis gr. vj.
Extracti hyoscyami... gr. jss.

Misce et divide in pilulas duodecim. One after late dinner or at bedtime.

℞ Sodii sulphatis ʒj ad ʒij.
Sodii bicarbonatis gr. xx.
Sodii chloridi gr. x.

Misce, fiat pulvis. To be given early in the morning, after the pill, dissolved in half a tumblerful of hot water.

In those extreme cases in which from backward pressure the liver is enlarged, much relief is often felt from the application of 6 or 8 leeches over the hepatic region. A hot poultice should be applied after the leeches have been removed to encourage the bleeding.

Broadbent strongly advocates the use of *mercurial* purgatives in these cases because of their action in

"diminishing arterio-capillary resistance and of lowering arterial tension, and therefore of relieving the heart." He gives at the outset one or more full doses of calomel or blue pill combined with rhubarb pill or colocynth and henbane, followed by a mild saline, and then a milder dose every second or third night. Cardiac tonics should also be given at the same time, and other measures applied such as we have already described in the preceding chapter for the relief of the various symptoms of cardiac failure.

The scope and value of the Oertel and Nauheim methods of treatment will be considered at the end of this chapter.

Degenerations of the cardiac muscle do not offer much scope for therapeutic management: some forms, described as "*fibroid* disease" of the heart, and dependent on chronic myocarditis or obliterative endarteritis of branches of the coronary artery, and often associated with hypertrophy, are very difficult of diagnosis and offer no other indications for treatment than such symptoms of cardiac failure and circulatory disturbances as may accompany them, and as are also common to *dilatation* and to non-compensated valvular lesions; and these we have already described, and their appropriate treatment has been pointed out.

There are, however, two conditions of the myocardium which may now claim a brief consideration from a therapeutic point of view, viz. "**fatty degeneration,**" properly so-called, and the "**fatty overgrowth**" which so commonly accompanies excessive obesity. The former of these is a true granular and fatty degeneration of the cardiac muscle, which becomes pale and flabby. It arises in connection with defective nutrition, and may therefore be merely a senile change; it occurs also in cachectic and wasting diseases, and after prolonged attacks of the infective fevers, and especially after diphtheria. It may be the result of acute and chronic anæmia, especially of that form which is termed *pernicious;*

it is a well-known consequence of phosphorus poisoning; it sometimes follows attacks of pericarditis; it may be dependent on disease of the coronary arteries; and it is a common feature in the degenerative changes of chronic hypertrophy.

The symptoms of fatty degeneration are those common to cardiac failure from any cause; the diagnosis of this condition is therefore difficult, especially if a systolic apex murmur should happen to be present. The existence of very marked signs of cardiac failure without any history of pre-existing valvular disease, or exposure to the ordinary causes of endocarditis, may excite a well-grounded suspicion of the existence of fatty degeneration.

The breakdown is also often comparatively sudden; dyspnœa is complained of on the slightest exertion, with sighing and a sense of oppression in the chest. There is great muscular debility and incapacity for any exertion, physical or mental. Irritability of temper and other mental disturbances are probably dependent on an insufficient blood supply to the brain. The patient often feels cold and depressed, and his pulse is found to be slow, feeble, irregular, and intermittent: it may sink as low as 40 or 30 in the minute. The extremities are often cold and blue. The cardiac impulse is feeble, perhaps imperceptible, the first sound weak, and the action arhythmic; a systolic apex murmur may or may not be present. The area of cardiac dulness is often notably increased. Sleep is often disturbed by distressing attacks of cardiac asthma, so that the patient fears to fall asleep. *Anginal* attacks occur in some cases. Œdema of the lower extremities is of grave import. These are the symptoms our **treatment** must be directed to relieving. In all such cases we should begin by giving *digitalis;* the less advanced the degeneration the more likely it is to be useful, and it can do no harm; but if we find no response to its use in the shape of improved cardiac action, it is of no avail persisting with it. We should not, however,

give digitalis when the pulse is very slow and irregular, with a tendency to syncope.

In the more advanced and serious cases absolute rest in the semi-recumbent position is for a time of prime importance, and, at regular intervals, a proper amount of light, easily-digested, nourishing food must be given. If the patient responds readily to small amounts of alcoholic stimulant, such as a few teaspoonfuls of brandy or whisky in a little hot milk, there is no good reason for withholding it, although we must be especially careful not to yield to any morbid craving in this direction. To remove the sense of faintness or threatened syncope, and the distressing feeling of oppression at the chest, some diffusible stimulant will certainly be frequently necessary, such as the following:—

℞ Spiritus ætheris compositi
Spiritus ammoniæ aromatici } āā ʒiv.
Tincturæ nucis vomicæ mccxx.
Tincturæ lavandulæ compositæ ʒiv.
Aquæ carui ad ʒviij.

Misce, fiat mistura. One or two tablespoonfuls, with a tablespoonful of water, when necessary.

Strychnine is a very useful medicine in these cases, and it may sometimes be combined with coca with good effect, as in the following:—

℞ Liquoris strychninæ mxxxij.
Extracti cocæ liquidi ʒiv.
Spiritus chloroformi ʒij.
Aquæ cinnamomi ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls three times a day.

Oxygen inhalations are valuable as a cardiac restorative, stimulating cardiac nutrition and promoting metabolism.

If, perchance, there should be anginal attacks attended with a hard, firm pulse (which will rarely be found), a nitro-glycerine tablet containing the equivalent of one minim of a 1 per cent. solution may be given, and its effect noted.

Being much in the open air, the fresh air of the country, in order to promote as complete oxygenation of blood as possible, is extremely desirable; a hammock, or some suitable couch for reclining out of doors, is needed in these cases, and when the patient is strong enough to travel, much good will often result from passing the winter in a warm, sunny climate.

Such patients are very sensitive to cold, and require very warm clothing. In the less serious forms a certain amount of regular, gentle exercise may be permitted in fine weather, although there is a tendency, nowadays, rather to over-do physical exercise in cases of cardiac weakness, and as cases of fatty degeneration are notoriously difficult of diagnosis the benefit that has been observed to follow physical exercise, in some instances, may have been due to the fact that they were not cases of true fatty degeneration, but of temporary cardiac asthenia with dilatation. In all these cases the effect of exercise should be carefully watched, and its influence on the cardiac action noted. It must be remembered that anginal attacks are not uncommonly provoked in these cases by unwise attempts at physical exertion.

Preparations of iron are useful in the less advanced cases. We may combine the citrate of iron and ammonia in 10-grain doses with ½ a dram of aromatic spirits of ammonia and an ounce of infusion of calumba, and give it three times daily; or we may give 10 grains of the citrate of iron and quinine and 3 to 5 minims of liquor strychninæ in ½ an ounce of chloroform water in the same way; or we may give a pill of a grain of valerianate of iron and a grain of extract of nux vomica after meals three times a day.

What we have before said about the use of aperients in cases of cardiac failure must still be borne in mind, and the regulation of the bowels and the digestive functions generally must be duly seen

to. Unless there is any dropsy it is best, however, not to produce watery motions, and a dinner pill of aloes, rhubarb, and ipecacuanha will be most suitable.

As the digestive functions are generally very languid, it is often useful to give 5 or 6 grains of pepsine or a teaspoonful of acid glycerine of pepsine after each meal of animal food.

Restlessness and insomnia are often distressing symptoms in these cases, and although it is, for many reasons, undesirable to give opium, we shall occasionally be obliged to have recourse to it. We should first, however, try the effect of sodium bromide in 15- to 20-grain doses, alone, or combined with 1 or 2 drams of tincture of hops, or 20 to 30 minims of compound spirits of ether. If these fail we may try ½-grain and grain doses of codeia; and if we are obliged to give opium or morphine we should begin by giving ⅛th of a grain of sulphate of morphine with ½ a dram of aromatic spirit of ammonia in an ounce of chloroform water, and if this dose agrees well and causes no faintness, but seems, as will sometimes be the case, to improve the cardiac action, it may be repeated after four or five hours. We disapprove of the hypodermic use of morphine in these cases, as it will, if administered in this way, sometimes exercise a seriously depressing effect on the heart, and fatal results have been known to follow. Notwithstanding the recommendation of eminent authorities we must persist in our objection to this mode of administering morphine in cases of great cardiac asthenia. The extreme rapidity of the absorption of the drug given in this way augments its tendency to depress the action of the heart. When given by the mouth it can be combined with a cardiac stimulant, and it is not so rapidly absorbed. Recourse to the hypodermic syringe is far too common, and requires limitation and more discrimination.

Fatty overgrowth is associated with a general tendency to the disposition of fat, and is often

encountered in the obese. It may simply amount to an excess of the normal quantity of fat underlying the pericardium. In other cases the fatty deposit penetrates into the muscular substance of the heart, and is found as an infiltration between the muscular fasciculi.

In extreme cases of this kind the heart becomes enveloped in a thick covering of fat, and on section fat is found freely deposited amongst the muscular fibres, and this fatty infiltration may extend to the musculi papillares. Some of the muscular fibres are found atrophied, and others in a state of fatty degeneration. It follows naturally that the walls of the heart become flabby, and its cavities dilated, and symptoms of cardiac failure appear, and are more or less serious, according to the extent of the fatty overgrowth or degeneration, and the dilatation thus induced.

The chief **causes** of this condition are indolent and luxurious habits of life, over-feeding, over-indulgence in alcoholic beverages, especially in beer, together with insufficient muscular exercise.

The **treatment** appropriate to these cases will depend upon the stage the disease has reached when the patient comes under observation. In the later stages the symptoms of cardiac dilatation and failure which present themselves will require precisely the same kind of management as has just been described. In the earlier stages, where it may be presumed there is simply an excess of fatty deposit on the surface of the heart, and no serious amount of infiltration of the heart substance or atrophy of the muscular fibres, much may be done, with the frank co-operation of the patient, to ameliorate his condition and check the tendency to fatty deposition. In the first place all excesses in eating and drinking must be at once suppressed. No alcoholic beverages must be permitted, or at most a little sound claret or hock diluted with water. Drinking at meals must be forbidden, and

such fluid as is needed must be drunk either half an hour before a meal or an hour or two after. This will at once diminish the amount of food taken at each meal and ensure its more complete mastication. A glass of hot water half an hour before a meal and at bed-time, to which a slice of lemon may be added for flavour, will be useful both in promoting digestion, in flushing away waste products, in allaying thirst, and in promoting the secretion of bile and the regular action of the bowels. As in the treatment of obesity,* fats and carbohydrates should be as far as possible eliminated from the daily dietary, and nitrogenous food taken in its stead. The lean of butcher's meat, chicken, game, and white fish, preferably reduced to mince or pulp and lightly cooked, may be freely taken. Green vegetables and salads and ripe fruits in moderation may be permitted. In the early stages of this affection much benefit often results from one or more courses of mineral waters and baths at Marienbad, Carlsbad, Kissingen, Brides, or Harrogate; or a combination of graduated physical exercises, together with gaseous saline baths, as practised at Nauheim.

Moderate regular exercise, walking or riding, should also be insisted on.

We may here take occasion to refer to what is known as Oertel's cure for cardiac diseases, and especially for this form of disease. It may be described as consisting of graduated and systematised *hill-climbing*, a method of treatment of some value in a limited class of cases, but not unattended with danger when widely or indiscriminately applied —a fact that has had some serious and notable exemplifications in the land where it originated.

In many health resorts in Germany and Switzerland this so-called "Terrain-Kur" was added to their other attractions, and systematised mountain-climbs were marked out and adapted to different

* For which, *see* the author's "Food in Health and Disease."

degrees of cardiac disability. But it has fallen into comparative disuse. It was not suited to uncompensated cases of valvular disease, and compensated cases found the system monotonous and tedious.

Gentle climbing exercise in compensated cases of valvular disease, in light, bracing air, amidst agreeable scenery, may serve to maintain and improve compensatory hypertrophy and promote general nutrition, especially in those who are prone to habits of indolence and inactivity. But it is especially in cases of fatty heart, fatty infiltration without degeneration of the muscle, that this system may be of service, as it insists on regular, graduated exercises, a most important auxiliary to other means of cure, such as baths and frictions, *massage* of the muscles, a suitably regulated diet, with strict limitation of liquid, and perhaps a course of mineral waters at one of the spas we have named. The object is to get rid of the excess of fat and to restore the cardiac tone. It is occasionally adopted as a supplementary course to what is known as the Schott methods, to which we must in the next place refer.

The **Schott** or **Nauheim** system of treatment of heart disease consists in the application of "*resistance exercises*," and the use of the saline and gaseous baths at Nauheim.

The *resistance exercises* are systematic and regulated movements of the different groups of muscles, gently resisted by the physician or his assistant. These movements are never repeated twice in succession, and are always followed by a period of repose. The patient is, of course, carefully watched during these exercises, and at any sign of circulatory or respiratory trouble, or of muscular or nervous exhaustion, the movements are at once suspended. The seventeen or eighteen movements of which the exercises consist will be described under the *additional formulæ*. In commencing this treatment it may be proper to apply only a portion of these exercises,

which may be cautiously increased. It has been noted that the effect of these exercises is to cause a slowing of the pulse-rate, and an increase in the pulse volume. It is also maintained that they lessen the area of cardiac dulness, and when dilatation is present cause the apex beat to return towards its normal position. In addition to these exercises the Schott method comprises the application of the saline baths of Nauheim in the following manner. The chief constituents of the Nauheim springs are sodium chloride (20 to 30 parts in 1,000), and calcium carbonate (2 to 3 parts in 1,000), together with a large amount of free carbonic acid, and they are of a temperature varying between 82° and 95° F. These waters are used either as (*a*) *brine baths*, or (*b*) *effervescing baths*, or (*c*) *effervescing current baths*.

The first are without free carbonic acid and are used in graduated strengths.

The second contain the natural carbonic acid gas, but are varied in temperature to suit particular cases.

In the third or stream baths the water is allowed to stream through the baths while in use.

The effervescing baths are said to lessen the pulse rate, increase its volume, and raise the tension. They also, at first, quicken and deepen the respirations. The treatment usually begins with the weak brine baths at a temperature of about 95° F. and a duration of five minutes. After a time the temperature of the bath is lowered, and its strength and duration increased (to ten minutes).

The brine bath is changed to an effervescent bath as soon as the patient is thought able to bear it—at a temperature of 92 to 95° F. and a duration of about six minutes. The temperature is gradually lowered and the duration increased.

The effervescent *stream* bath is finally applied in such cases as can bear so strong a stimulant. Artificial, imitation Nauheim baths can be easily made, and they have the same effects as the natural springs.

The formula for these baths will be found at the end of this chapter. The patient must repose for a time after each bath, and he should not take more than three or four baths a week.

Unfortunately this method of treatment has been *commercially boomed* to an extent which has rendered it more and more difficult to form a just and accurate opinion as to its true value and applicability.

As to the conclusions that have been advanced by some with respect to the reduction of the area of percussion dulness observed after these baths and exercises, they are certainly for the most part fallacious, as are also the figures with which they have been illustrated.

The result of a series of careful observations made by us in King's College Hospital as to the effect of these baths on the area of cardiac dulness appeared to show clearly that the diminution of this area was caused mainly by a modification of the type of respiration—the measurements of the chest circumference showed that there was an increased expansion of the upper part of the lungs, the portion least used in ordinary quiet breathing; that, in short, the type of respiration becomes changed, and a superior costal type takes the place to some extent of the more habitual inferior costal and abdominal type. "This accounts for the rise in the level of the diaphragm and the position of the apex beat noted by Schott and others. It accounts to a great extent for the rapid contraction in the right boundary of the area of cardiac dulness, as the marked increase in the capacity of the upper regions of the lung would greatly widen the respiratory area, and would thus exercise a decided influence on the condition of the right side of the heart in the way of promoting and facilitating the emptying of its cavities."*

That the method is useful in a certain number of cases of cardiac asthenia cannot be doubted, and when the influence of mere *fashion* has passed away, we

* *See* the author's paper in *International Clinics*, July, 1896.

shall be better able to form a sober and accurate estimate of its applicability.

It is curious to notice how even eminent authorities differ in this respect. One says, "In cases of introspective people with neurotic hearts, the treatment is best avoided."* While another maintains that "the best results will be obtained in functional or imaginary heart disease in neurotic individuals."†

It is in cases of cardiac asthenia and dilatation following acute disease that we have seen the best results from this treatment, and also in nervous persons with dilatation from strain and over-exertion, mental and physical.

It is only in exceptional cases of valvular disease that it is rightly applicable, while in many it may prove injurious. Cardiac patients are often very restless people, and this method of treatment gives them something to do and something to think about, and in this way it may prove, to such persons, a comfort and a help.

ADDITIONAL FORMULÆ.

In hypertrophy with aortic regurgitation.

℞ Tincturæ aconiti, ♏ss.
Tincturæ veratri viridis, ♏vj.
Tincturæ zingiberis, ♏iijss.
Aquæ ad ℥j.
M. f. haust. To be taken three or four times a day. (*Da Costa.*)

Another.

℞ Tincturæ aconiti, ♏x.
Potassii bromidi, ʒij.
Spiritus ætheris nitrosi, ʒv.
Aquæ camphoræ, ad ℥iij.
M. f. mist. A teaspoonful every two hours. (*Whitla.*)

Powders for cardiac hypertrophy.

℞ Asparagin, gr. x.
Potassii bromidi, ʒij.
Sacchari albi, ʒiij.
M. et divide in pulv. x. One thrice daily. (*Matlack.*)

Pills for cardiac dilatation.

℞ Pulveris digitalis, gr. v.
Extracti belladonnæ, gr. ½.
Ferri redacti, gr. xl.
M. et divide in pulv. xx. One thrice daily. (*Da Costa.*)

* Powell, "Treatment of Diseases of the Heart," p. 85.
† Broadbent, "Heart Disease" (third edition), p. 415.

Mixture for simple dilatation.

℞ Extracti ergotæ fluidi, ʒiijss.
Tincturæ digitalis, ʒv.
M. f. mist. A teaspoonful three times a day in water.
(*Bartholow.*)

In cardiac asthenia and dilatation.

℞ Pulveris digitalis, gr. iij.
Quininæ sulphatis, gr. xv.
Pulveris rhei, gr. xv.
Sodii bicarbonatis, gr. xv.
M. et divide in pulv. x. One twice a day. (*Schnitzler.*)

Pills for cardiac dilatation.

℞ Ferri lactatis, ʒss.
Pulveris digitalis, gr. v.
M. et f. pil. xx. One three times a day. (*Da Costa.*)

In fatty degeneration.

℞ Spiritus ætheris, ʒj.
Tincturæ belladonnæ, ♏clx.
Spiritus ammoniæ aromatici, ʒj.
Tincturæ zingiberis, ʒiij.
M. f. mist. A teaspoonful in a wineglassful of water when dyspnœa is severe. (*Whitla.*)

For cardiac asthma.

℞ Tincturæ digitalis, ♏cxij.
Tincturæ lobeliæ, ʒjss.
Aquæ lauroceras, ʒiij.
M. Five drops every hour.
(*Bamberger.*)

For cardiac dyspnœa.

℞ Potassii iodidi, gr. xx. ad. xxx.
Chloral hydrate, ʒss. ad ʒj.
Mucilaginis acaciæ, ʒiv.
Syrupi floris aurantii, ʒiv.
Aquæ ad ʒiv.
M. f. mist. A tablespoonful every two hours. (*G. Sée.*)

Hypodermic injection of camphor in cardiac disease when digitalis fails. (It sometimes renews the effect of digitalis.)

℞ Camphoræ, ʒj.
Olei olivæ, ʒix.
M. Fifteen drops for a dose.
(*Alexander.*)

Hypodermic injection of caffeine and morphine.

(The caffeine is added for the purpose of avoiding the depressing effect of the morphine.)

℞ Caffeinæ, gr. ss.
Morphinæ sulphatis, gr. $\frac{1}{8}$.
Atropinæ sulphatis, gr. $\frac{1}{100}$.
Aquæ camphoræ, ♏xx.
M. f. injectio. (*Cochrane.*)

The Schott movements or exercises.

Each exercise is made against slight resistance applied by the physician or a trained assistant.

1. The arms are extended in front of the body at the level of the shoulder, with the palms of the hands touching. The two arms are then moved slowly outwards till they are in a line with each other; they are then brought back to their original position.

2. The arm and hand hanging down with the palm turned forwards, the forearm is flexed upon the arm (which is kept still) until the fingers touch the shoulder. The forearm is then extended to its original position. This is first done with one arm and then with the other.

3. The arms, hanging down as in No. 2, are raised outwards until the thumbs meet over the head; they are then returned to their original position.

4. With arms dependent, the fingers, at the first phalangeal joints, are pressed together, and the arms are then raised until the hands are above the head, after which they are brought back to their original position.

5. The arms, hanging in the position of "attention," are advanced forwards parallel to each other until they are elevated to a vertical position; they are then brought back to where they were before.

6. Same as No. 1, but with fists clenched.

7. Same as No. 2, but with fists firmly clenched.

8. The arms, starting from the position of "attention," describe a circle by moving forwards and upwards until they are raised vertically; then each palm is turned outwards and the arms descend backwards to their former position.

9. The body is bent forwards and then brought back to the erect position, the knees not being moved.

10. The body is rotated, without any movement of the feet, first to the right and then to the left, and then back to its original position.

11. The body is flexed laterally, as far as possible, first to the one side and then to the other, and afterwards restored to its original erect position.

12. The patient, standing with the feet side by side and supporting himself by leaning with one hand upon any object, flexes the opposite thigh as far as it is possible, and afterwards extends it until the feet are again side by side; then, leaning on the other hand, he carries out a similar movement with the other thigh.

13. The patient, supporting himself by one hand, as in 12, and the knee being kept straight, each leg in turn is raised as high as possible in front of the body, and then in the same way behind.

14. Supporting himself by placing both hands in front on the back of a chair, the patient first flexes one leg and then the other upon the thigh as far as he can.

15. Each leg in turn is abducted as far as possible, the knees being kept straight, the patient resting on one or other hand the while.

16. The arms, held horizontally outwards, are rotated forwards and backwards at the shoulder joint.

17 and 18. Flexion and extension, first, of the wrists, and, second, of the ankles.

In resisting these movements the operator places the palm of his hand on that side of the patient's limb or body towards which the movement is to be made. In the movements of the wrist the operator closes his thumb and forefinger round that joint.

Artificial Nauheim Baths.

The weak bath which is used at the commencement of the treatment can be made by dissolving 1 lb. of sodium chloride and 1½ oz. of calcium chloride in 10 gallons of water at a temperature of 95° F. The duration of this bath should be five minutes. The strength of the bath is gradually increased until the full strength of 3 lb. of sodium chloride and 4½ oz. of calcium chloride to 10 gallons is reached. The duration of the bath is also gradually lengthened to fifteen or twenty minutes and its temperature gradually lowered till it reaches 85° F. To make the effervescing bath sodium bicarbonate and hydrochloric acid are added to the full strength of the brine bath. After dissolving 3 lb. of sodium chloride and 4½ oz. of calcium chloride in 10 gallons of water, 2 oz. of sodium bicarbonate is to be thoroughly mixed with the water; then, just before the bath is used, 3 oz. of hydrochloric acid are added. The strength of the bath is increased day by day until 8 oz. of the alkali and 12 oz. of the acid are used for a bath of 10 gallons.

CHAPTER V.

THE TREATMENT OF CARDIAC NEUROSES—PALPITATION—CARDIAC PAIN—ANGINA PECTORIS.

Palpitation—Its Nature and Causes—"Irritable Heart"—"Paroxysmal tachycardia"—"Bradycardia"—*Treatment* of Palpitation—Open-air Life—Regimen—Diet—Cardiac and other Tonics—Bromides for Sleeplessness—Antacids—Aperients—Hysterical Cases.

Cardiac Pain—"Sub-mammary Pain"—Its Nature—Value of Local Counter-irritation—Digital Exploration of Præcordial Region—Cases of Cardiac Pain—Relation of these to Cases of true Angina—Aortic Strain.

Angina Pectoris—Symptoms—Causes—Classification—Objections to the *vaso-motor* hypothesis—*Causal Indications for Treatment*—Hygienic Treatment—Treatment of Dyspeptic States—Avoidance of *Toxic* Agents—Removal of Gouty and other Blood Contamination—Importance of Elimination—*Medicinal* Measures in the *Intervals*—In the *Paroxysms*. Additional Formulæ.

We must next consider the treatment of those affections of the heart which are regarded, mainly, as disorders of cardiac *innervation*, and which may occur independently of the existence of structural disease. It must, however, be obvious that the presence of structural disease is no impediment to the manifestation of disorders of cardiac innervation, and that although we are now about to consider these affections as distinct and independent morbid states, they do, very commonly, co-exist with structural disease of the valves and walls of the heart, and may be more or less closely connected therewith.

Palpitation.

Palpitation may be described as a consciousness of the heart-beat; an "irregular or forcible action of the heart *perceptible* to the individual."

The heart-beat is usually in health unconscious, except that in most persons the heart-beat may be rendered conscious by the assumption of certain positions. There are many healthy individuals who

on lying down at night in bed on the *left* side become conscious of the heart-beat. The explanation of this would seem to be that the heart suffers more displacement when one lies on the left side than on the right.

But palpitation as a morbid condition is more commonly referrible to some disturbance of cardiac innervation. Palpitation usually means that the heart-beat is not only conscious, but that it is actually increased in force and rapidity. Cases are, however, encountered, though rarely, in which the palpitation is wholly *subjective*, and although the patient may complain of the most distressing feelings of beating and throbbing at the heart, on physical examination the heart is found to be acting with perfect regularity. Such a condition is doubtless one of cardiac hyperæsthesia, and we have found, in such cases, that pressure made immediately over the cardiac apex will elicit an expression of pain, which will not be felt by making the same kind of pressure over adjacent parts of the surface of the chest.

But commonly the complaint of palpitation is accompanied by increased rapidity and force of the cardiac contractions; the patient's body may sometimes be seen to shake with the force of the heart beat, and the coverings of the bed to be lifted with each impulse; at the same time the carotids throb violently. There is a sense of oppression and discomfort in the cardiac region, a feeling of fulness in the head, of giddiness or faintness, and even an apprehension of impending death.

The **causes** of this condition are various. It would certainly seem to be frequently *central*, and dependent primarily on some disturbance of the emotional centres; in some cases it would seem to depend on a disorder of the *vaso-motor* nerves; and in others on *reflex* irritation of the cardiac nerves.

Emotional disturbances of any kind will induce palpitation in many persons, but especially in the feeble and excitable, so that it is much more common in females than in males. Anæmia and chlorosis, and

all debilitating influences, certainly predispose to, if they do not actually cause, palpitation.

Excessive mental labour, together with sleeplessness, will give rise to palpitation. But it must be remembered that palpitation is itself a cause of sleeplessness by the quickened circulation through the brain which it produces, as well as the discomfort attending it. The palpitations observed in youths of both sexes, about the age of puberty, are frequently associated with hysteria, sexual excitement, or masturbation.

Hyperlactation has been mentioned as a cause. It is especially prone to accompany neurasthenic states, disorders of menstruation, and the troubles of the climacteric period.

A combination of mental excitement and excessive muscular effort seems to have been the cause of the "irritable heart" observed by Da Costa amongst the young soldiers in the American Civil War. The chief symptoms were palpitation with greatly quickened pulse, dyspnœa, and more or less cardiac pain.

Dyspeptic states and flatulence are frequent causes of palpitation. In such instances, not only may there be reflex irritation of the cardiac nerves from offending ingesta, but when there is over-distension of the stomach and intestines by gas or by excess of food or drink, as in great eaters and drinkers, then there is the further disturbing influence of upward displacement of the heart by the pressure of the distended stomach and intestines upon it. The palpitation associated with constipation is often of this kind, although it has been regarded as reflex and referred to the irritation of the abdominal nerves by scybala.

Disease of the pelvic viscera and especially uterine displacements and inflammation are frequent causes of palpitation.

Whatever causes diminished blood-pressure by dilating the small arteries and lessening the obstruc-

tion the heart normally has to overcome may excite palpitation, as alcoholic intoxication, exposure to excessive heat in hot baths, Turkish baths, etc.

The cardiac nerves, in certain persons, are prone to be disturbed by certain substances in common use, such as tea (especially certain kinds, as *green* tea), coffee, tobacco, etc. These sometimes disturb the cardiac rhythm and produce irregularity and intermission together with vague, uncomfortable feelings in the region of the heart, without causing actual palpitation. And it is generally their excessive or prolonged use, not their moderate or occasional use, that causes these disturbances of cardiac innervation.

It has been stated that the occurrence of palpitation about the period of puberty is often due to the heart not developing in proportion to the rest of the body. We have already said that it is a common incident of organic heart disease, and it forms one of the most striking symptoms, as we shall see, in that singular affection, "*exophthalmic goitre.*"

Tachycardia is the name that has been invented to distinguish the "*rapid heart*" from the heart affected by palpitation. It is used to express a fact which is common enough, viz. that some persons habitually have a rapid pulse rate, just as others have a slow pulse rate. *Paroxysmal tachycardia* is used to express the fact that certain persons suffer from rapid action of the heart occurring in paroxysms, generally associated with palpitation, and not unfrequently accompanied with dyspnœa and cardiac pain. The dyspnœa may be so severe as to suggest an attack of asthma. This affection would appear to be frequently dependent on the same causes as palpitation, but it has also been found connected with structural lesions of the medulla and vagi (tumour or clot). One of the most remarkable instances we ever saw, in which the pulse rate was 200 to 230, was associated with utero-gestation.

An unusual *slowness* of the pulse, which is the

normal condition in some individuals,* and is said to occur paroxysmally in others, has received the denomination of *brachycardia* or *bradycardia*. As a morbid phenomenon it is found in states of exhaustion from protracted acute and other debilitating diseases; in certain chronic dyspeptic states, and jaundice; in cardiac degeneration; occasionally in pulmonary emphysema; in uræmia and other toxæmic states; in certain diseases of the nervous system, apoplexy, tumours, sunstroke, etc. etc.

The **treatment** of these disturbed states of cardiac innervation, and especially of palpitation, must now be considered.

The first and most important indication is to endeavour to seek out the cause of this disturbance, and if possible to remove it. When it is clearly dependent on emotional excitement and disordered mental states we must take measures to subdue them, and especially we must reassure the patient, and try to convince him that the symptom is not a dangerous one; when it is associated with debility we must prescribe appropriate tonic remedies. When due to sexual aberrations or hysterical conditions we must frankly explain the cause of the malady and point out the only sure method of cure. When produced by excess of work, physical or mental, we must insist on the remedial effect of rest. When accompanying disorders of the female pelvic organs those must be taken in hand and properly treated. If dependent on dyspeptic states, flatulent distension, and constipation, dietetic and medicinal measures must be directed to their removal. When clearly traceable to the toxic influence of some habit, such as the excessive use of tea, coffee, or tobacco, these must be forbidden. When it is connected with some organic lesion of the heart, the remedies already set forth as appropriate to them must be applied. And finally, when it is a symptom associated with incurable lesion

* Napoleon is said to have had a pulse rate of 40, and Talleyrand to have always had a very slow and intermittent pulse.

of the nervous system, we must have recourse to certain sedative agents, which may at least afford temporary relief.

Nothing is perhaps more generally useful and applicable to many forms of palpitation than regulated exercise in, and *free exposure* to, the open air. In debilitated states, when the cardiac muscle is weak, much walking exercise is undesirable, but gentle driving exercise is most useful, and sitting or reclining in the open air has both a tonic and sedative influence. Bodily restlessness, which in some persons accompanies mental disturbance, must, however, be kept under control, and nine or ten hours' rest in bed should be insisted upon. In many nervous cases judicious hydrotherapeutic treatment, such as warm affusion applied generally, followed by cold sprinkling, especially along the spine, which may in time be altered to a brief cold douche, succeeded by brisk friction of the skin, will be found most beneficial.

In these nervous patients nothing is more certainly opposed to successful treatment of their co-existing dyspeptic troubles than the "little and often" method of feeding by which they attempt to still their abnormal "cravings." We should, therefore, insist on due and sufficient intervals between meals; if we have evidences of a slow and feeble digestion we should allow at least five, and often six hours, to intervene between successive meals. Nothing whatever should be permitted between meals beyond a cup of hot water with a few teaspoonfuls of milk, or a small cup of light broth or *consommé*. Tea, coffee, tobacco must be prohibited, but small quantities of sound wine and pure spirit, well diluted with water, may be permitted at meal times. The meals themselves should consist of a moderate amount of easily digestible and nourishing food, chiefly animal, previously minced or pounded, if any masticatory carelessness or defect exists, and a small quantity of vegetable purées. The fluid at meals should be strictly limited.

It may be necessary in neurasthenic cases, with

anorexia and great inanition, to apply the Weir-Mitchell system rigorously.*

In cases associated with anæmia or exhaustion, especially after acute illnesses, much benefit will follow the administration of some suitable form of iron combined with strychnine. Strychnine and nux vomica act better as cardiac tonics in many of these cases than digitalis or strophanthus; we should always, however, *try* the effect of digitalis in small doses, as it sometimes acts remarkably well, but if it does not quickly produce a good effect we should relinquish its use. Belladonna is thought by some to be more useful than digitalis, especially if combined with sodium bromide.

The following formulæ are useful:—

℞ Ferri et quininæ citratis gr. xl. ad lxxx.
Liquoris strychninæ ♏xl.
Spiritus chloroformi ʒ ij.
Acidi hydrobromici ♏lxxx.
Aquæ ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls twice or three times a day, an hour before food.

Or this:—

℞ Ferri et ammonii citratis gr. lxxx.
Tincturæ nucis vomicæ ♏cc.
Sodii bromidi gr. lxxx.
Spiritus ammoniæ aromatici... ... ʒiv.
Aquæ ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls three times a day.

In more distinctly neurotic cases valerianate of zinc and iron will be found very valuable. A grain of either of these made into a pill with half a grain of extract of nux vomica may be ordered twice a day an hour after food. It may often be desirable, when sleeplessness accompanies palpitation, to give a full dose of bromide at night; 15 to 30 grains of sodium or potassium bromide in an ounce and a half of chloroform water should

* *See* the author's "Food in Health and Disease" (new edition), p. 467.

be ordered at bed-time: it is generally advisable at the same time to recommend the patient to sleep with his head and shoulders well raised on pillows, so as to prevent the abdominal contents from pressing on the cardiac region, and to allow of nothing but a little soup or other light food for some hours before bed-time.

When palpitation accompanies organic disease of the heart, or is associated with cardiac hyperæsthesia, as evidenced by tenderness on pressure over the cardiac apex, a plaster of belladonna or opium applied over the præcordia is of great use.

In a troublesome case of paroxysmal palpitation accompanying aortic and mitral disease in a young woman, we found painting strong iodine paint along the course of the pneumogastric nerves in the neck was quickly followed by relief of the palpitation and reduction of the pulse rate from 120 to 80.

When symptoms of chronic gastric catarrh are associated with palpitation, a gastric sedative and antacid should be prescribed, such as

℞ Bismuthi carbonatis gr. x.
Magnesii carbonatis gr. v.
Sodii bicarbonatis gr. x.
Aquæ laurocerasi ʒj.
Aquæ caryophylli ad ʒj.
Misce, fiat haustus. To be taken an hour before food twice a day.

Suitable aperients should also be ordered in case of constipation, and in obstinate cases with retained scybala, enemata of soap and water, with a few tablespoonfuls of olive oil added, should be administered with a long tube. In hysterical cases a combination of valerian and bromides often proves useful—20 grains of sodium or ammonium bromide with half a dram of the ammoniated tincture of valerian and an ounce of chloroform water may be given for a dose.

Various expedients have been recommended for the treatment of the paroxysmal forms, such as an

ice-bag over the cardiac region, a tablespoonful of brandy in a little water (dangerous on account of the risk of exciting a craving for alcohol), a mixture of sal volatile and compound spirits of ether with tinctures of lavender, henbane, cannabis indica, etc.

Broadbent observes that "to arrest an attack of palpitation it is sometimes only necessary to take a dozen deliberate deep breaths."*

For *paroxysmal* "heart-hurry" the bromides and belladonna have been found useful; an ice-bag or Leiter's tubes over the heart, and the application of the continuous galvanic current along the course of the great nerve trunks in the neck, have also been recommended. This condition is, however, not very amenable to medical treatment. The *slow pulse*, when constitutional, needs no treatment, but individuals with this peculiarity require more active stimulation and a more supporting *régime* when attacked by any acute illness than others. When it is a symptom of cardiac exhaustion or degeneration it needs the same supporting and tonic remedies as we have already fully described.

CARDIAC PAIN.

Before we pass on to consider that grave cardiac affection known as *angina pectoris*, it will be well to refer to other less serious forms of cardiac pain which we encounter. All experienced practitioners are aware of the fact that when a patient complains of "pain at the heart" it is an expression frequently used very vaguely, and simply refers to the existence of pain about the anterior part of the chest on the left side, which may not be of cardiac origin, but dependent on rheumatism, or intercostal neuralgia, or costal periostitis, or acute or chronic pleuritis, or some flatulent or dyspeptic state. There is, however, a particular form of pain frequently complained of by young chlorotic women

* "Heart Disease" (third edition), p. 358.

who are at the same time the subjects of menstrual irregularities, and which is termed "**sub-mammary pain.**" It is frequently associated with ovarian irritation and tenderness, especially on pressure over the left ovary. We have had occasion to believe that this sub-mammary pain is, in many cases, really cardiac. An attentive exploration of the region of the cardiac apex with the tip of the finger will often reveal the fact that this is the precise seat of the pain complained of, and firm pressure here with the finger-tip will greatly aggravate it.* With such patients you may press with moderate firmness on various parts of the surface of the chest with the tip of the finger without provoking any complaint of pain, but the instant the pressure falls over the cardiac apex the patient starts back with a decided expression of suffering. Dr. Balfour, in the first edition of his valuable lectures on "Diseases of the Heart," spoke of this "sub-mammary pain" as "wholly external," but he modified this view in his second edition, and says: "In most the pain is truly cardiac in character." But it sometimes occurs in its most obstinate forms in young women who are not anæmic, but who suffer from ovarian irritation. In these cases a peculiar hyperæsthesia† of the cardiac substance seems to be set up, possibly of a reflex nature. When sub-mammary pain is associated with anæmia it will disappear as the anæmia disappears, and will require the same treatment; but when it occurs in robust, florid girls, with sexual irritability, we have found the repeated application of small flying blisters over the cardiac apex and over the painful ovary (almost always the left) the most effective mode of treatment.

* *See* a clinical lecture by the author, on "Pain at the Heart and Palpitation," in the *Lancet* of Aug. 12th, 1882.

† Harvey had the opportunity of making some observations on the Duke of Montgomery, whose heart was partially exposed after the healing of a severe wound of the chest, and he convinced himself that the heart in a healthy state was entirely wanting in sensibility.

Professor Peter pointed out that in some of these conditions of cardiac pain, certain distinctly painful spots may be made out on exploring the anterior surface of the chest with the tip of the finger. If there is a hyperæsthetic state of the myocardium, pain on pressure will often be found to exist in the fourth and fifth left intercostal spaces near the sternum, and also over the cardiac apex. In cases of "tobacco-heart" in middle-aged men, Peter noticed that pressure over a very limited point in the third left intercostal space, near the sternum, gave rise to acute pain, and he thought this pain corresponded with the auriculo-ventricular groove, and that it was probably due to a morbid condition of the ganglion of Remak, caused by tobacco. *Conscious* cardiac intermissions accompany this state of the tobacco-heart, as they also do some cases of coffee intoxication. The pain, on pressure, which is found to exist in some cases of disease of the aorta and its valves, in the second left interspace close to the sternum, and over the sternum itself at the same level, is, according to Peter, not due to the lesion of the aorta itself, but to a neuritis propagated from the diseased aortic tissues to the nerves lying on it. Neuritis and neuralgia of the cardiac plexus is revealed by pain on pressure with the tip of the finger (attacks of angina have been provoked by *too strong* exploratory pressure) either in the third, second, or first left intercostal space near the sternum, and especially the second, a few lines from the sternum. In these cases there is some tenderness on pressure over the vagus, just at the root of the neck, inside the anterior border of the sterno-mastoid.

In connection with the co-existence of valvular disease it is certainly noteworthy how much less frequently we have complaint of cardiac pain in mitral than in aortic cases, although cardiac *discomfort*, not amounting to severe pain, is common enough in mitral cases. It has been suggested that the reason of this probably is, that in aortic disease there is

often a chronic inflammation of the coats of the aorta, which extends to the contiguous nerves of the cardiac plexus.

The annexed diagram (Fig. 11) shows the situation of spots of well-marked tenderness on pressure in a case under our care of aortic valve disease, together with signs of aortic dilatation. The patient (who had had four attacks of acute rheumatism) complained of *pain at the heart* shooting through the left breast to the back, and also of sudden pains across the chest, causing him to stop short when walking. He also had some

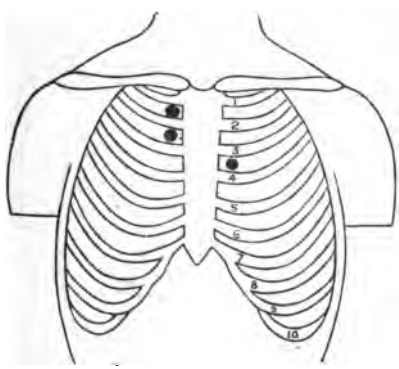


Fig. 11.—Painful Spots in a case of Aortic Regurgitation.

dyspnœa, cough, and blood-stained expectoration. He was pale and emaciated. Pulse 104, small. This patient was greatly benefited by the following treatment, and the pulse was reduced to 88: flying blisters, the size of a florin, over the upper sternal and præ-aortic region, 5 minims of tincture of digitalis, 10 grains of ammonio-citrate of iron, and an ounce of infusion of calumba, thrice daily.

In another case of aortic regurgitation in a lady 32 years of age, who had been under our observation for some years, she at one period, after a shock owing to the death of a sister, complained of much nervous

distress and sleeplessness, but especially of *pain in the cardiac region*, shooting down both arms to the elbows, and aggravated by the least exertion; also of palpitation; pulse 120. There was in this case distinctly one, but only one, painful spot on pressure with the tip of the finger over the front of the chest, and this was at the sternal end of the second left interspace. She was greatly benefited, and this tender spot disappeared, and the pulse came down from 120 to 80, by the same treatment as that just described, viz. counter-irritation over the præ-aortic

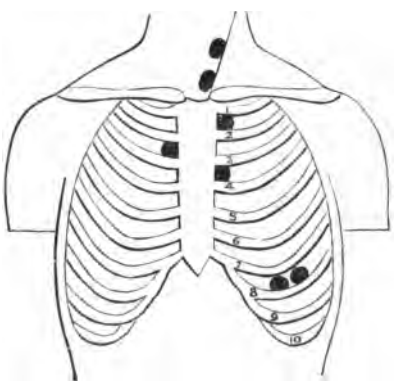


Fig. 12.—Painful Spots in a case of Aortic Disease.

region by means of flying blisters and a combination of digitalis and iron.

In another aortic case (obstructive and regurgitant murmurs), a young man 22 years of age, under our care in King's College Hospital,* complaint of *cardiac pain* was a most notable symptom. The pain, commencing in the cardiac region, would shoot down the left arm, and was at times very severe and prevented him from sleeping, and was much aggravated by exertion. Countenance pale and anxious, much

* This case was carefully noted by Dr. Silk, the then house physician.

cardiac hypertrophy, apex beat in seventh interspace $1\frac{1}{2}$ inch outside nipple line. Much general arterial thickening. The exploration of the chest and neck revealed several points where there was great tenderness on pressure. They are shown in the accompanying diagram (Fig. 12).

There are two points close together over the diffused apex beat, others in the first and third left interspaces close to sternum, another in the second right interspace close to sternum, and two points over the course of the vagus in the neck, just in front of

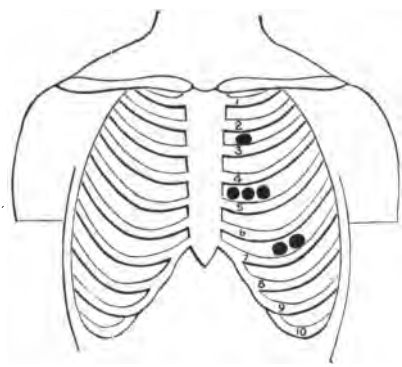


Fig. 13.—Painful Spots in a case of Mitral Disease.

the anterior border of the sterno-mastoid. This patient was greatly relieved by the following treatment: rest in bed, a diet composed largely of milk, small flying blisters over the base of the heart, small doses of digitalis with ammonio-citrate of iron, and sometimes with ether and ammonia, and occasionally, when the cardiac pain was very severe, hypodermic injections of morphine. In this case there probably existed not only neuritis of some of the nerves of the cardiac plexus, but also some chronic myocarditis and more or less degeneration of the cardiac muscle; hence the pain at the apex, where the degeneration is usually most advanced.

In another aortic case* somewhat resembling the foregoing, painful points were found on pressure over the vagus in the neck, as well as in the first and second left interspaces close to the sternum, and relief was at first experienced from counter-irritation; but subsequently the patient was attacked at night with paroxysms of pain and dyspnœa of an anginal character, which were relieved by inhalation of nitrite of amyl.

The preceding diagram (Fig. 13) shows the painful

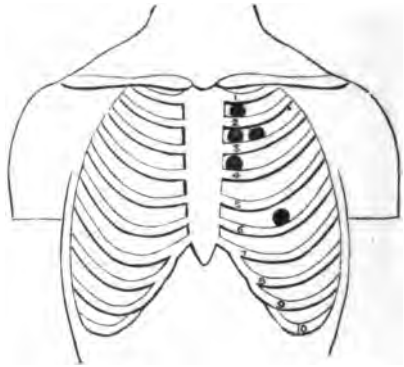


Fig. 14.—Painful Spots in a case of Functional Cardiac Disease.

points noted in a case of mitral stenosis, with incompetence, in a female 32 years of age, who complained greatly of severe "pain at the heart," extending into the back between the shoulders. In this case, owing to the co-existence of fibroid disease with retraction of the left lung, the surface of the heart was largely uncovered. Cardiac pulsation was visible in all the situations of the painful spots, and doubtless some chronic inflammation of the cardiac muscle had conferred upon it a morbid sensibility. Counter-irritation in the form of small flying blisters, rest in bed,

* Carefully observed and noted by my former clinical clerk, Mr. C. G. Hodgson, of Brighton.

occasional frictions with the mixed belladonna and chloroform liniments, small doses of digitalis and iron, led to the relief of pain, to regulation of the cardiac action, and to great improvement in the general health.

The next diagram (Fig. 14) shows painful points observed in a case in which the cardiac disturbance was purely functional. A housemaid, 25 years of age, accustomed to carry heavy trays upstairs, complained of "pains at the heart darting through the chest" and palpitation. She could not move without distressing palpitation, accompanied with dyspnœa, and "throbbing at the heart." The pain was worse after food and on attempting to mount stairs. She suffered also from dysmenorrhœa, constipation, and flatulence. She had been in the habit of drinking a *quantity of tea* three times a day. Her cheeks were flushed, but her lips and gums were pale and bloodless. The heart's impulse was greatly exaggerated, and the large vessels at the root of the neck pulsated strongly. There were no murmurs. On exploring the cardiac sensibility the following painful points could be made out: one over the apex and others at the sternal end of the first, second, and third left interspaces. She was ordered to abstain from tea, and she was given 8 minims of tincture of digitalis, with ammonio-citrate of iron and infusion of calumba, thrice daily, and a daily dinner pill of aloes and nux vomica. She rapidly improved, the painful spots became less sensitive, and then disappeared; the pulse was reduced from 120 to 84, and in a month she was quite well, and the cardiac pain and sensibility had disappeared. This was a case of disturbed cardiac innervation with hyperæsthesia, induced by excessive tea-drinking, and augmented by the severe muscular efforts she had to perform.

The affinity between these minor attacks of cardiac pain and the graver cases of angina pectoris is illustrated by another case, a housemaid also, aged 21, who complained of severe pain in the cardiac region,

brought on by carrying heavy trays upstairs. The pain came on *suddenly* two or three times a day, and extended down the left arm, which, she said, "went stone cold." She suffered also from loss of flesh and headaches. Pulse 100, feeble. No murmurs. There was marked tenderness on pressure in the third left interspace, extending from the sternum outwards for three-quarters of an inch. There was *distinct localisation* of *extreme tenderness* over this spot. There was also a tender point, but much less sensitive, over the apex. She was first treated with iron and calumba thrice daily, and chloroform and belladonna liniment locally. This, after a month, had given but little relief. Five grains of potassium bromide were then added to each dose of the mixture, and a flying blister, the size of a florin, was ordered to be applied for two hours at a time over contiguous spots at and near the sternal end of the third left interspace. Under this treatment the tender points disappeared, and the pain in the cardiac region and left arm disappeared also.

This case was doubtless one of true cardialgia, probably induced by over-fatigue and cardiac strain, and it had many points in common with angina pectoris. It is noteworthy how in this and other like cases the cardiac tenderness seems to be specially localised about the sternal end of the second or third left interspace, and how speedily the symptoms were relieved by counter-irritation over this spot. Another case which came under observation before we had adopted this method of exploring the cardiac sensibility is of interest as having apparently the same causation as the preceding. She was a waitress, 29 years of age, and had in her occupation to carry heavy trays upstairs. The attacks of cardiac pain were more distinctly paroxysmal and nearer still in character to those of true angina, and the case terminated fatally after only a few months' illness.

The causal relation between these last three cases is obvious. They were all young women in fairly good health, with no antecedents leading to cardiac

disease, save that they were all engaged in the same occupation, and all complained of the effects of carrying heavy trays upstairs. In the first and slightest of these cases the cardiac disturbance was undoubtedly aggravated by the abuse of tea. In all three, and especially in the last two, the symptoms complained of bore a striking likeness to one another. In neither of them, when first seen, was there any definite cardiac murmur. May we not trace the varying effects of cardiac or vascular strain in each of them? As we have already pointed out, in severe and sustained muscular efforts there is increased action of the cardiac muscle on the one hand, and increased resistance at the periphery from muscular compression of the arterioles and capillaries on the other. If the cardiac muscle is ill-nourished and weak from co-existing anæmia, then the ventricular wall may yield and become dilated, and we may get cardiac palpitation and pain from fatigue, malnutrition, and hyperæsthesia of the cardiac muscle. But if the tone of the cardiac muscle is fairly good and its contractions sustained and vigorous, then we should expect the strain to be chiefly felt at the commencement of the aorta, for in sustained muscular efforts it has to bear a two-fold distending influence: it has to bear the augmented impetus of the ventricular outflow, increased both in force and frequency, as well as the increased resistance in the peripheral vessels. In these circumstances it is not remarkable that it should become the seat of chronic inflammatory changes, which may extend to and involve the nerves of the cardiac plexus in relation with its walls; or a portion of its wall may yield and become the seat of aneurismal dilatation, as was most likely the case with the last patient.

ANGINA PECTORIS.

The consideration of the preceding cases of cardiac pain may possibly help us to the due understanding of the pathology and **treatment** of **angina pectoris**, which we must now examine.

The symptoms of the graver attacks of angina pectoris—those of the minor forms will be gathered from the preceding cases—are well known. The attack is prone to occur, especially on the first occasion, on the patient ascending some rising ground or making some slight muscular effort after taking food. The pain, which is very severe, suddenly seizes the patient in the sternal region, and is accompanied by a feeling of constriction of the chest, as though it were compressed in a vice; the pain shoots through to the back and down the left arm usually, but sometimes also down the right. The agony is so great that the patient stands motionless, dreading sudden dissolution, and fearing to draw a breath, although the respiration is perfectly free. The face is usually pale and the hands cold. The pulse is very variable in character, sometimes weak and irregular, sometimes quite regular, and sometimes of heightened tension. The attack, as a rule, passes off suddenly, after a few minutes or even seconds, but it may last much longer, with varying intensity, or may assume the form of a series of paroxysms. As the attack passes off there is usually some eructation of gas, and often a copious discharge of urine. The attacks may only occur at long intervals, or they may be of frequent occurrence in the more serious forms. Mental emotion is often an exciting cause, and so are physical exertion and errors in diet, and dyspeptic states; distension of the stomach, with flatus, being especially prone to induce an attack. Unless, as is most frequently the case, there is serious disease of the heart, the health during the intervals between the attacks may be quite satisfactory. Although, in the greater number of cases, the attacks are apt to follow physical exertion and emotional excitement, it is not so in all cases; some if the most serious cases have occurred when the patient has been at rest, or have actually awoke him from sleep.

The classification that has been attempted of cases

of angina pectoris, and their separation into distinct groups, appear to us somewhat forced and unnatural. We regard *angina* as a neurosal *incident* of cardiac, organic, or functional disease—most frequently the former. It is not a disease in itself; it is a phenomenon or manifestation of disease. The cardiac lesions underlying the anginal attacks may vary in their nature, but the anginal attacks maintain their resemblance to one another, differing only in their severity. We do not admit the *pseudo*-angina of some authors. Hysterical imitative anginas, however, certainly occur. But, as the cases we have quoted conclusively show, there is simply a gradation of severity and curability between the so-called cases of *pseudo*-angina and those of *true* angina. The only sure ground of classification is the ascertainable absence or presence of cardio-vascular changes. In all the graver forms of angina, we believe, there exists a serious organic, cardiac, or vascular lesion, although not always detectable; and in the milder or curable forms we have simply to do with a cardiac neuralgia, or hyperæsthesia, induced either by temporary conditions of cardiac malnutrition or cardio-vascular strain; or it may be dependent on an inflammatory affection of branches of the cardiac plexus, itself dependent on an aortitis; or else it may be brought about by states of blood contamination; and in the latter case it is associated with vaso-motor excitement and increased arterial tension. We object to the term *vaso-motor* anginas as resting on a hypothesis that is by no means established or consistent with extended clinical observation. We have seen reason to regard the heightened arterial tension and "vaso-motor spasm" which has been assumed by some physicians to be the *cause* of anginal attacks as merely an *incident* of the same—an aggravating incident, no doubt, but not bearing a *causal* relation to the origin of the attacks. On further clinical observation it will be found that heightened arterial tension is a frequent incident, probably of a reflex nature, in other neuralgias, and

notably in neuralgia of the branches of the fifth nerve. We have seen in patients in other respects in perfect health, and free from neurotic tendencies, an attack of neuralgia of the superior maxillary nerve from dental irritation attended with marked increase of vascular tension, with a rise of 20 to 30 in the pulse rate, and the attack passing off with an excessive flow of clear urine.

It would seem that the shock or irritation of certain kinds of pain is able of itself, in some instances, to raise vascular tension to a remarkable degree, and we believe that in those cases of angina in which the arterial tension has been found to be increased (and there is no evidence that it is so in *all* cases, or even in the majority), this augmentation of vascular tension will be found to be a sequence, not a precursor, of the attack, a consequence of the shock of pain, a reflex irritation of the vaso-motor centres.

Huchard, in his writings on Angina Pectoris, maintains that *true* angina is always due to degenerative disease of the coronary arteries and consequent cardiac ischæmia, and that all other cases are cases of pseudo-angina and may be of neuralgic origin.

Our present object, however, is to seek for **indications for treatment,** and we must, therefore, briefly consider the known modes of *causation* of attacks of angina pectoris. And, first, with regard to those graver cases which are associated with serious structural disease of the heart and vessels. Now, when we consider that in by far the greater number of deaths from organic disease of the heart, in which we find all the various lesions present that have been found in fatal cases of angina, yet no true anginal attacks have ever been complained of; when we consider this well-known fact, we must admit there is some other additional circumstance needed to account for the angina. Certainly, obstructive disease of the coronary arteries has been found associated in a considerable number of cases with fatal attacks of angina, but extreme aortic regurgitation, extreme degeneration of

the myocardium, and extreme dilatation of the cavities of the heart have no *necessary* causal relation to attacks of angina. The most serious forms of angina seem to have a complex causation: first, there *must* be a *neurosal* element, the nerves of the cardiac plexus suffer irritation, and a cardiac neuralgia or cardiac nerve pain of an intense character is excited; this acts as a shock to the motor nerves of the heart,* and in fatal cases the heart muscle on the verge of failure from organic causes is shocked by the attack of nerve pain, and if some reflex arterial spasm should be excited at the same time, it will have to encounter an augmented peripheral resistance as well. In such cases the *rapidity* of the fatal issue is no argument against the neuralgic nature of the angina. Here there is a *complex* association of depressing causes in the struggle with which the heart may fail and sudden death occur; or it may struggle successfully with the earlier attacks, but as its struggling power becomes exhausted it must finally succumb. We have pointed out how in certain conditions *strain* is apt to fall (when the aortic valves are competent) rather on the first part of the aorta than on the ventricular surface, and this more especially is the case in habitual high arterial tension; and we are disposed to think that anginal attacks are more prone to occur when the strain falls especially upon this part of the vascular system, which is in such close relation with the nerves of the cardiac plexus, than when the mitral or aortic valves are incompetent, and the strain is felt on the interior of the cardiac cavities. Certainly enormous distension of the *left auricle* and of the *left ventricle* may long exist without producing any symptoms analogous to angina. The late Sir T. Grainger Stewart remarked that he had "more than once

* It is quite possible, if the immediate *pre-anginal* state of the circulation were known, or had been observed, that a condition of cardiac excitement, of increased muscular action, caused the onset of extreme *nerve* pain, the shock of which *lowered* the cardiac action, and so led to the relief of the pain. This would explain the short duration of many of the attacks.

seen a patient describe a curve on his chest like that of the aorta to indicate the site of his pain," and we have pointed out how counter-irritation over this region will often prove most effective in relieving the milder forms of cardiac pain.

In the next place let us inquire what is the *causation* of the less grave and more entirely remedial forms of angina. In these also the causation is in many instances complex. We may have a feeble, ill-nourished, cardio-vascular system, from anæmia, submitted to undue strain, as in the cases we have previously described, the strain, as we have just stated, falling, we believe, especially on the first part of the aorta; or we may have some intoxication, such as that of tea, tobacco, alcohol, gout, or some intestinal toxin, irritating the cardiac and the vaso-motor nerves, causing central irritability, increasing peripheral resistance, and so exciting anginal attacks, which may altogether pass away and be completely recovered from. *Vaso-motor spasm* as a unique cause of attacks of angina must, we think, be set aside as inconsistent with extended clinical experience. Cases of angina pectoris, both of the milder and graver forms, occur without any evidence of vaso-motor spasm or of heightened arterial tension, and the conditions of heightened arterial tension, together with a feeble cardiac muscle, very commonly co-exist without any tendency whatever to the development of anginal attacks; and we have already given reasons for concluding that when anginal attacks are found associated with heightened arterial tension, the latter may be a reflex consequence of the cardiac pain. The argument in favour of a vaso-motor causation of anginal attacks has been inferred from therapeutic experiment and the relief to the paroxysm that has attended the use of agents which cause arterial relaxations. But most, if not all, of these vaso-dilators are also *anæsthetics*, and, as Balfour has pointed out, it is to their anodyne action on the cardiac sensory nerves that they owe their chief efficacy; and Sir T. Grainger

Stewart also pointed out that nitrite of amyl has a direct effect on nervous structures, and that it relieves other forms of neuralgia. We have seen a patient with his countenance purple and the peripheral vessels intensely dilated under the influence of nitrite of amyl, without the slightest relief to his anginal attack. But we readily admit that nitrite of amyl and its allies do relieve many anginal attacks, and, to a certain extent and in some cases, by the lowering of the vascular tension they produce, with out, however, admitting that there is a direct causal relationship between the anginal attacks and heightened arterial tension.

With these preliminary considerations we are now in a position to formulate certain **indications** for **treatment.** These are :—

1. To maintain, or improve when defective, the general nutrition, to avoid all strain, physical and emotional, and so to relieve cardiac feebleness and effort.

2. To relieve dyspeptic conditions and flatulent or fæcal distension of the stomach and intestines.

3. To forbid the habitual consumption of agents which may exercise a toxic action on the heart, as tea, coffee, tobacco, alcohol, etc., or which may introduce or develop toxins in the alimentary. canal.

4. To avoid and remove all gouty and other blood contaminations.

5. To give such tonic remedies as may improve the cardiac tone and lessen existing tendencies to cardio-vascular degeneration.

6. To relieve the paroxysmal attacks by sedatives and stimulants.

1. Anginal attacks occurring in persons who present signs of anæmia, and defective nutrition generally, must be encountered, in the first place, by attention to hygienic measures. Such patients must be removed from all causes of physical or mental strain. Their life must be one of complete repose of mind and body—a repose alternated with gentle

physical exercise, always stopping short of the slightest fatigue; it is good for them, however, to be much in the open air, driving, sailing, or reclining, and in a mild climate, when possible, so that they shall be protected from the injurious effects of cold, exposure to which certainly favours the occurrence of these attacks, not only by lowering the nervous force, but by checking free cutaneous circulation and elimination. Much attention should also be paid to their diet.* It should be of the most nutritious nature, so far as is consistent with ease of digestion. An almost exclusive milk diet will be found to be of great service in many cases. When the digestive powers are greatly weakened, it may be necessary to have recourse to pre-digested foods, or to give with the foods some artificial digestive agent, such as pepsin or pancreatine. We have found a wineglassful of cream mixed with the same quantity of hot water, and a teaspoonful of sal volatile added, an excellent food on getting up in the morning. The lighter kinds of fish—soles, whiting, flounders, etc.—simply grilled, and eaten with a squeeze of lemon and plain uncooked butter, are excellent; lightly boiled or poached eggs are permissible; and also good *consommé*, flavoured with vegetables; the lean of fresh meat, well minced and lightly cooked, is most digestible and nourishing; fresh vegetables in the form of purées are useful, and so is the pulp of cooked fruits, as affording the necessary variety in the food and promoting the action of the bowels. Light milk puddings are also commendable, but they should be taken alone, not together with other kinds of food. We should also see that a sufficient quantity of pure water, and preferably *warm*, is consumed, for eliminative as well as assimilative purposes.

2. This first indication cannot, however, be thor-

* It is very common to advise such patients to take food at *short* intervals. Now, if this instruction is given, it should be pointed out that the food must be *fluid*, and must remain *fluid* in the stomach. The digestive functions of a person in feeble health are not *quickened*, but the contrary; and to give *solid* food at *short* intervals in such cases is only to aggravate dyspeptic states.

oughly carried out without due regard to the second —viz. *to relieve dyspeptic conditions and flatulent and fæcal distension of the stomach and intestines.* The co-existence of dyspeptic states must be treated in accordance with the principles already laid down in another chapter. An alkaline bitter stomachic, composed of sodium bicarbonate, nux vomica, and calumba, an hour before the two principal meals, will be found valuable. Or in other cases a dose of dilute hydrochloric acid in compound infusion of orange-peel after food, with the addition of a few grains of pepsin, may be given. Flatulent distension during digestion will often be effectually relieved by a pill containing a grain of thymol or menthol, or a drop of creasote taken directly after food. Regular evacuation of the bowels is most essential—checking, as it does, the formation of injurious toxins in the intestine, eliminating waste substances, and relieving abdominal distension. For some persons the best aperient is a dinner pill, containing a grain or two of aloes, half a grain of powdered ipecacuanha, a grain of nux vomica powder, and a grain of soap; this may be taken before or after dinner. Should such a pill prove insufficient, it may be followed by a teaspoonful of Carlsbad or Homburg salts in half a tumblerful of hot water the next morning. In cases where there is a sluggishness of liver, with bile-stained conjunctiva, a few grains of blue pill, or $\frac{1}{3}$rd or $\frac{1}{2}$ a grain of calomel at bed-time, with 2 or 3 grains of compound rhubarb pill, may take the place of the dinner pill.

3. The next indication is also an important one; for certain of the slighter forms of angina are no doubt dependent on, and the more serious forms may be provoked by, the habitual use of certain substances which come, in course of time, to exercise a **toxic** action on the heart. The action of these toxic agents is all the more subtle because they may be taken for many years without apparently producing any injurious effect, and it is often difficult to convince a

patient that what he has so long done with impunity has at length become injurious. This is particularly the case with **tobacco,** the toxic effects of which on the heart are often delayed until, or even after, middle age, when they will perhaps somewhat suddenly make themselves felt. With regard to alcohol, it is singular to observe how in different individuals its toxic and degenerating influence will sometimes fall on one organ, and sometimes on another. The cardio-vascular system in some persons is especially prone to undergo serious degenerative changes under its influence, while in others it almost entirely escapes, and hepatic and gastric troubles more especially arise, and in women the peripheral nervous system is most prone to be affected; but whenever anginal symptoms arise, we should always insist either on complete abstinence from alcohol, or on its very sparing use in a very dilute form. Tea and coffee are often provocative of the slighter manifestations of cardiac pain and discomfort, and it is noteworthy that they are particularly prone to be aggravated by any emotional disturbance. All these toxic agents must be forbidden so long as any tendency to anginal attacks exists.

4. The fourth indication is to remove and avoid all gouty and other blood contamination. The importance of **elimination** in the treatment of angina pectoris is universally admitted; and we desire to emphasise the importance of a free evacuation of waste products from the system. When renal elimination is defective from the co-existence of renal degeneration we must act freely on the bowels and on the skin. When the kidneys are sound, the free use of pure water or some suitable mineral water, having some slight stimulating action on the kidneys, may avoid the necessity of free purgation; but in all cases a thorough daily evacuation of the bowels should be procured, and free action of the skin should be maintained by warm baths and frictions. In gouty cases, and in all cases of defective elimination, a careful and spare but adequate diet should be prescribed. Animal food

should be taken in strict moderation, and fresh vegetables and fruit, carefully cooked and prepared so as to be made easy of digestion, should take a prominent place in the dietary. Alcoholic stimulants should be avoided as far as possible; and when milk is not unacceptable to the patient a few weeks of an exclusive milk diet may be advantageous; but a diet of this kind requires the patient to remain *entirely at rest* during its adoption.

5. In the fifth place we come to the consideration of the medicinal treatment of these cases, and first of the appropriate treatment in the intervals.

In anæmic cases and cases of temporary cardiac debility from removable malnutrition, we shall find the milder preparations of iron combined with small doses of digitalis, such as we have already described in the early part of this chapter, of great service. In other cases we shall find **arsenic** of greater value than iron; there is a general consensus amongst experienced physicians as to the value of arsenic in the treatment of cases of angina pectoris in the intervals between the paroxysms. Balfour asserted that arsenic is "indispensable in all forms of weak heart, accompanied by pain."* He advised that it should be given in the form of Fowler's solution, 3 to 5 minims, combined with iron and strychnine, twice a day, after food. We cannot too strongly insist on the value of *strychnine* as a cardiac tonic, especially in remediable states of cardiac asthenia. In highly neurotic cases much benefit may be derived from a combination of iron or arsenic and sodium bromide, in 5- to 15-grain doses; and in the same class of cases the valerianate of zinc is also of great service; it may be given in grain doses in a coated pill thrice daily, after food; and sometimes the combination of $\frac{1}{60}$th of a grain of phosphorus with it renders it a more valuable nerve-tonic.

We have already pointed out the usefulness of digitalis in the milder cases, the cases which some

* "Diseases of the Heart" (second edition), p. 313.

authors term *pseudo-angina;* and we have seen long periods of immunity from attacks apparently brought about by occasional recourse to a mild iron tonic, with 5-minim doses of tincture of digitalis, or a pilule of Nativelle's digitaline ($\frac{1}{100}$th grain). The idea of giving a combination of nitro-glycerine and digitalis, during the intervals, is a concession to the vaso-motor hypothesis of the mode of causation of the attack, to which we shall immediately recur.

Digitalis is not a very suitable tonic in any case where there is greatly heightened arterial tension—in such cases strophanthus or caffeine has the advantage over digitalis of not contracting the arterioles.

There is another remedy which is of very great value in the treatment of angina pectoris, especially when it is associated with obvious signs of cardio-vascular degeneration and of the gouty state, and that is potassium or sodium iodide. It checks the progress of degenerative changes, it stimulates glandular organs, and efficiently promotes elimination, and it appears also to prevent vaso-motor irritability—all these effects may depend on its eliminative properties. It is one of the most efficient anti-neuralgic agents in other forms of nerve pain. It may be given in 5- to 15-grain doses, three times a day.

Huchard maintains that the iodides alone are capable of curing this disease. He prefers the sodium iodide.

In cases traceable to *malarial* intoxication, if arsenic fails to relieve, quinine should certainly be given; but in such cases evidence of arterio-sclerosis will usually be present, and will indicate the use of potassium or sodium iodide. It has recently been stated that cocaine, in doses of $\frac{1}{3}$rd of a grain, twice daily, has the power of entirely preventing attacks of angina; but Huchard thinks it a dangerous drug in this disease, and he would argue that these were not cases of *true* but of *pseudo-angina.*

Rumpf * has suggested a mode of treatment of

* *See Practitioner*, October, 1899, p. 475.

this disease founded on the theory that it is dependent on calcification of the coronary arteries, and designed to *decalcify* them by increasing the elimination of lime. A diet poor in lime is prescribed—meat, 8 ounces; bread, fish, potatoes and apples, each 8 ounces, and the following mixture to be taken daily: Sodium bicarbonate, 150 grs., neutralised by a sufficiency of lactic acid, to be added to 150 grains each of lactic acid and of sugar, and 6 ounces of distilled water.

Strange to say, he does not point out the importance of avoiding *drinking* waters containing lime! He reports a remarkable success in 25 per cent. of the cases in which he applied this treatment.

6. It only remains to consider the indications for the relief of the paroxysmal attacks. Those who see in the causation of the anginal paroxysm the predominating influence of vaso-motor spasm consider the main indication for the relief of the paroxysm is to administer medicinal agents which are known to have the power of relaxing the arterioles, and so of lowering arterial tension, and, to that extent, to relieve the heart of a certain amount of the peripheral resistance it has to overcome. They therefore advocate the use of the *nitrites*, such as the nitrite of amyl, nitroglycerine, and sodium nitrite. That these agents do relieve the paroxysm in many cases of angina is certain; that they do so wholly by their action as vaso-dilators is extremely doubtful. They are capable of relieving the anginal attack when there is no certain evidence of the existence of vaso-motor spasm. Douglas Powell says he has found them "far more reliable in the graver cardiac cases than in the purer vaso-motory,"* but it is in the latter that they should prove most efficacious if the prevailing theory of their action were true. Balfour and Grainger Stewart both maintained that they act as direct analgesic agents, and that they have the power of relieving pain in other neuralgias as well as in cardiac,

* *Transactions* of Medical Society, vol. xiv., p. 276.

independently of their relaxing action on the blood-vessels; and this view we adopt, as the most consistent with the clinical history of this disease.

Nitrite of amyl is best administered by inhalation. A capsule containing 3 or 5 minims should be broken in a handkerchief, and inhaled. In some cases, however, it entirely fails to relieve, although it may produce, in a most marked form, its characteristic effect of dilating the vessels. Nitro-glycerine is preferred by others, and it has been pushed until very large doses have been taken—as much as 35 drops of a 1 per cent. solution have been given and repeated at short intervals during an attack, and 7 minims three times a day in the intervals.* We should begin, however, with much smaller doses—1 to 2 minims of the 1 per cent. solution. Whitla recommends still smaller doses ($\frac{1}{1000}$) very frequently, so as to maintain the effect and avoid the severe headaches which often follow the larger doses. Sodium nitrite may also be employed for the same purpose; its effect is said to be more lasting than that of nitrite of amyl and nitro-glycerine. It is given in tablets of $2\frac{1}{2}$ grains; one to four of these may be given for a dose. At the onset of an attack, in addition to the inhalation of nitrite of amyl, which, owing to the rapidity of its action, is the most suitable remedy to start with, we may give some warm diffusible stimulant, such as 30 minims of sulphuric ether, or a dram of nitrous ether, with a dram of sal volatile or a little brandy in an ounce or two of peppermint water. The feet and hands, if cold, may be placed in hot water. Balfour complained that he had been disappointed in the action of nitro-glycerine, and preferred inhalations of nitrite of amyl; and when these fail—as they often will—he resorted unhesitatingly to chloroform inhalations, and he adduced a great weight of evidence in favour of his contention that "so far from being unsafe in cardiac disease, it is often of the greatest use in these cases."† Sulphuric ether is used

* *Transactions* of Medical Society, vol. xiv., p. 291.

† "Diseases of the Heart" (second edition), p. 309.

also for the same purpose, but, as Balfour said, "it is not rapid enough. Chloroform acts more quickly, even more effectually, and is perfectly safe." He gave it poured on a sponge, in a smelling-bottle, and the patient was told to breathe it through his nose as deeply as possible. "In this way relief is obtained in a few seconds, and so soon as the narcotic influence is produced the smelling-bottle drops, and with it rolls away all risk of any overdose."

Professor Bradbury, of Cambridge, introduced *erythrol tetra-nitrate* as a vaso-dilator and a remedy for angina pectoris. Its use has also been commended by others who have employed it. It is less rapid in producing its effects than amyl-nitrite or nitro-glycerine, but its influence is much more lasting. The dose is 1 grain in alcoholic solution or in tablets.

Gibson * thinks highly of the inhalation of iodide of ethyl. Its beneficial action he believes to be "due to the liberation of free iodine, which is rapidly absorbed by the blood."

In severe and protracted attacks we may be obliged to have recourse to hypodermic injections of morphine. A sixth or a quarter of a grain may be injected for a dose. Morphine seems to be better tolerated in cases of cardiac pain with a weak heart than when it is given to relieve other neuralgias in the same circumstances. When it is given to relieve cardiac pain there seems to be less risk of its causing cardiac depression. It is, however, a good plan to give some ether and ammonia mixture at the same time, to counteract any such possible depression, or a small dose of strychnine (gr. $\frac{1}{40}$ to $\frac{1}{20}$) may be combined with the hypodermic injection of morphine. The ethereal tinctures of valerian and of castor have been found useful. The inhalation of *pyridine* has been said to give immediate relief, but the unpleasant penetrating odour of this substance makes patients object greatly to its use. Bromide of ethyl has also been used in inhalation. We have already remarked

* "Diseases of the Heart and Aorta," p. 784.

on the value of counter-irritation in the form of flying blisters in those cases where a chronic aortitis may have involved contiguous branches of the cardiac plexus. A hot mustard poultice to the præcordial region may be useful at times. The application of the continuous electric current along the course of the vagus, in the neck, and down the arm, in cases where a distinctly painful *aura* is experienced in the hand, has been found useful in warding off attacks. Leeches applied over the sternal region and repeated small bleedings from the arm have been found useful in some cases.

ADDITIONAL FORMULÆ.

Drops for palpitation.

℞ Tincturæ digitalis, ʒijss.
Tincturæ valerianæ, ʒij.
Ferri acetatis ætheris, ʒiij.
M. f. mist. Twenty-five drops in water three times a day.
(*Schnitzler.*)

For functional palpitation.

℞ Spiritus ammoniæ aromatici, ʒj.
Ætheris sulphuris, ʒij.
Tincturæ zingiberis, ʒjss.
Essentiæ menthæ piperitæ, ʒiij.
Spiritus camphoræ, ʒiij.
Tincturæ cardamomi compositæ ad ʒiij.
M. f. mist. A small teaspoonful in a wineglass of water every fifteen minutes whilst the palpitation and difficulty of breathing are severe. (*Whitla.*)

Another.

℞ Acidi hydrobromici diluti, ʒvj.
Tincturæ belladonnæ, ʒivss.
Tincturæ nucis vomicæ, ʒv.
Glycerini puri, ʒjss.
Tincturæ quininæ ad ʒvj.
M. f. mist. A dessertspoonful in two tablespoonfuls of water three times a day before meals. (*Whitla.*)

For neurotic palpitations.

℞ Tincturæ digitalis, ♏xxxvj.
Potassii bromidi, ʒv.
Aquæ ad ʒx.
M. f. mist. One to three tablespoonfuls daily.
(*Huchard.*)

For palpitations connected with masturbation.

℞ Potassii bromidi, ʒvss.
Tincturæ digitalis, ♏cxc.
Infusi cascarillæ, ʒiv.
M. f. mist. A dessertspoonful two or three times a day.
(*Da Costa.*)

Pills for nervous palpitation.

℞ Pulveris digitalis, gr. lxxv.
Pulveris asafœtidæ, gr. lxxv.
Syrupi, quantum sufficiat
Ut f. pilulæ centum. One to four pills daily. (*Withering.*)

For the anginal paroxysm.

℞ Spiritus ammoniæ aromatici, ʒj.
Sodii bicarbonatis, gr. x.
Tincturæ cardamomi compositæ, ʒj.
Spiritus chloroformi, ♏xx.
Solutionis nitro-glycerini (1 per cent.), ♏j.
Aquæ ad ʒjss.
M. f. haust. To be slowly sipped on the commencement of symptoms. (*Powell.*)

In anginal attacks.

℞ Ethyli bromidi, ʒss.
Aquæ destillatæ, ʒxijss.
M. Two to four tablespoonfuls for a dose. (*Seguin.*)

For the intervals in angina pectoris.

℞ Quininæ sulphatis, ʒss.
Acidi arseniosi, gr. ss.
Extracti valerianæ, q.s.
Ut f. pil. xxx. Two to four daily. (*Gallois.*)

For the anginal attack.

℞ Tincturæ digitalis, ♏lxxv.
Tincturæ belladonnæ, ʒjss.
Tincturæ valerianæ, ʒj.
Spiritus ætheris compositi, ʒj.
M. f. tinct. Ten to twenty drops during the attack. (*Gallois.*)

For angina pectoris.

℞ Sodii iodidi, gr. 80 ad 160.
Sodii arsenatis, gr. $\frac{3}{4}$.
Aquæ destillatæ, ad ʒv.
M. f. mist Two or three teaspoonfuls daily. (*Huchard.*)

CHAPTER VI.

THE TREATMENT OF DISEASES OF THE ARTERIES: ARTERIO-SCLEROSIS (ATHEROMA, OR ENDARTERITIS DEFORMANS)—ANEURISM.

ARTERIO-SCLEROSIS, or Atheroma—Its Nature and Causation—Heredity—Vascular Strain—Athletic Exercises—Toxæmic States—Dietetic Excesses and Errors—Effects of heightened Blood Pressure—Necessity for *Treatment* in early Stages—Potassium Iodide—Eliminative Measures—Mineral Waters—Exercise—Food—Hygiene.

INTERNAL ANEURISM—Causation—Degenerative Changes—Sudden Strain—Syphilis—*Symptoms*—The Form of the Aneurism influences its Curability—*Indications for Treatment*—Blood-letting—Rest and restricted Diet—The *Tuffnell* Method—Objections to it—Modifications of it—*Potassium Iodide*—*Electrolysis*—Introduction of *Foreign* Bodies into Sac—*Distal Ligature*—*Proximal Pressure*—MacEwen's Method—Ergot and Ergotin—Gelatin Injections—Ice—*Treatment of Symptoms*—Pain—Dyspnœa—Anginal Attacks. Additional Formulæ.

THE arteries are prone to undergo degenerative changes, fatty, calcareous, and hyaline; but that which chiefly concerns us here is the disease affecting the walls of arteries, known as *atheroma*, or *endarteritis deformans*, or **arterio-sclerosis**, the existence of which in the large vessels is one of the chief conditions on which the occurrence of **aneurism** depends.

ARTERIO-SCLEROSIS.

This affection of the arteries appears to be a true *arteritis*, the inflammation attacking chiefly the middle coat (*mesarteritis*), and involving also the adventitia (*periarteritis*); it is attended with infiltrative and degenerative changes, and weakening of the walls of the vessel occurs in consequence. The proliferative changes and thickening which at the same time occur in the *intima* are regarded as *compensatory*, and in the early stage before these occur rapid dilatation at the weakened spot may take place, and thus an *aneurism* be formed.

Atheroma is a process of chronic inflammation followed by degeneration. The so-called "*atheromatous ulcer*" is formed by the breaking down of the degenerated tissue and rupture of the endothelium, with the production of a "branny detritus," or molecular *débris*.

Diffuse arterial changes of this kind are common. They occur in old people as a **senile** change, and are caused by the wear and tear or natural strain to which the arterial tubes are subject. But such changes also occur prematurely in certain comparatively young persons, when their arterial tissues are especially vulnerable, so that chronic arteritis readily arises from relatively slight irritation. This vulnerability would seem, in some cases, to be inherited. "Entire families sometimes show this tendency to early arterio-sclerosis—a tendency which cannot be explained in any other way than that in the make-up of the machine bad material was used for the tubing."*

Strain of the arterial walls from excessive internal blood-pressure is the chief factor in the direct production of these changes. One of the most common causes is the practice of athletic exercises by persons not well adapted by their original conformation to such efforts. Severe athletic exercises, even in the muscularly strong and robust, if pushed beyond a certain degree, tend to be followed by the morbid results of arterial strain; how much more so must this be the case when such exercises are undertaken by persons of feeble organisation, whose nervous energy and emulation prompt them to these unequal contests?

These arterial changes are also induced by constitutional blood conditions, acting either as *direct* irritants to the arterial tissues, or *indirectly* by causing heightened blood-pressure. Alcohol, gout, rheumatism, lead, syphilis (this last probably excites a *specific* arteritis), may any of them cause endarteritis. The poisons of certain fevers, especially malarial fevers, have the same effect on certain constitutions.

* Osler, "Practice of Medicine" (fourth edition), p. 770.

Over-filling of the blood-vessels from excess of food and drink, when combined with indolence, may also become a cause of this condition.

Diffused *arterio-sclerosis* (*arterio-capillary fibrosis*) is often found associated with *renal* changes, cardiac hypertrophy, and "fibrous myocarditis." In some cases the *renal* changes may be primary and the arterial secondary; but in many others the arterial sclerosis appears to precede the renal affection.

In the *pulmonary artery* and its branches sclerosing changes are found as a consequence of continued increased tension in the pulmonary vessels, caused by mitral disease and emphysema. Similar changes have been found in the venous system (*phlebo-sclerosis*) after exposure to heightened blood-pressure.

Considering the serious nature of the many morbid changes (apart from large aneurisms, which will be considered separately) to which arterial degeneration gives rise, the **treatment** of the earlier stages of this affection has scarcely received adequate attention. When we encounter, on examining a patient who may be thought to be sound in health (a candidate for life assurance, for instance), or who may complain of some trifling derangement, a pulse of high tension, arteries more or less palpably thickened, elongated, and tortuous (we should examine the *brachials* for this purpose as well as the *radials*), some evidence of ventricular hypertrophy, and an accentuated aortic second sound, we should estimate adequately the danger to which such a person is exposed. Should the *coronary* arteries become involved there is the probability of attacks of *angina pectoris*, and the certainty of cardiac degeneration. Should the *cerebral* arteries be especially affected, we may encounter symptoms of cerebral degeneration, or of cerebral hæmorrhage from rupture of miliary aneurisms. Degenerative pulmonary emphysema and asthma are not uncommon accompaniments of this disease. *Renal* degeneration and wasted kidneys may be a consequence,

as well as a cause, of arterio-sclerosis. Are we helpless to prevent the development of these serious morbid states? By no means. If such patients will be content to follow a rational and a strict *régime*, hygienic, dietetic, and medicinal, not only may these risks be kept in abeyance, but a distinct improvement in the condition of the arterial system may be brought about. In the first place, it is necessary to seek out evidences of any constitutional vice that may need rectifying. Syphilis ought never to be overlooked; and even should we be in error in suspecting its existence, a mild anti-syphilitic treatment cannot do harm; and it is a great advantage that small doses of *potassium* or *sodium iodide* long continued are as useful in the gouty and rheumatic as in the syphilitic forms, and many Continental physicians maintain that this drug is a true tonic to the heart. We do not share this view, but we believe that the improved cardiac action which is observed to follow its use depends rather on its remarkable eliminative effects and its consequent influence on the blood-vessels, removing peripheral resistance, and so diminishing arterial tension. We should give it in 3- to 5-grain doses three times a day, combined with 5 to 10 grains of potassium bicarbonate, 20 minims of aromatic spirits of ammonia, and an ounce of a bitter infusion, such as calumba, gentian, or serpentary; we should continue its use with occasional interruptions of ten or twelve days for three or four months at a time; the bowels should be always kept freely relieved by some suitable aperient; and if dyspeptic symptoms and constipation are prominent conditions, occasional courses of mineral waters will prove of much value. But their use must be wisely directed, as any overfilling of the vessels must be guarded against, and it must be seen that the water ingested passes freely away by the kidneys or bowels, or by both.

In the corpulent the waters of Marienbad, Kissingen, Tarasp, or Brides, or others of this class, are more suitable; for the thin and ill-nourished dyspeptic,

Vichy, Royat, Neuenahr, Baden-Baden, and also Kissingen, may be recommended. Tepid baths of short duration, combined with friction of the skin, are of value for promoting cutaneous excretion, but long-continued hot baths must be avoided. Regular moderate exercise in good air, always stopping short of fatigue, is to be encouraged, but all violent or strenuous muscular exertion and all participation in athletic contests should be strictly prohibited.

In some cases with threatenings of cardiac failure, from post-hypertrophic degeneration, as indicated by irregular and intermittent heart-beat, attacks of dyspnœa on slight exertion, or from flatulent distension of the stomach, and occasional attacks of giddiness, a few small doses of nitro-glycerine from time to time will generally give relief.

The food should be limited to the actual wants of the system. The meals should be small, and taken at adequate intervals; they should be eaten slowly, and no fluid should be taken with the meal, but afterwards. Fresh vegetables may be eaten freely, but animal food and eggs only sparingly. Alcohol and tobacco should be abstained from. A milk diet proves very useful in some cases, especially when it promotes free diuresis.

Sexual excitement in advanced cases is certainly undesirable; and emotional disturbances should, as far as possible, be guarded against. The body should be warmly clad, and exposure to extremes of heat and cold avoided; a bright, genial, sunny climate in winter is a great advantage.

We now pass on to the consideration of the most serious manifestation of arterial disease, namely,

ANEURISM.

The *medical* aspects of aneurism are confined almost exclusively to those affecting the aorta and the large arterial branches that spring from it within the thorax and abdomen, *i.e.* to "*internal* aneurisms." Aneurisms of the arteries of the limbs, often traumatic in their origin, fall under the care of the surgeon,

and are especially amenable to *surgical* treatment—compression, ligature, etc.

Aneurisms usually arise from a weakening of some part of the wall of an artery, such as the aorta, by chronic inflammation and degenerative changes such as we have already described; the wall of the artery is predisposed to yield in consequence of these changes, but some sudden strain, accidental or otherwise, is often the immediate cause of an aneurismal dilatation. Mechanical violence, or any strain put upon the arteries, suddenly or repeatedly, may lead to the production of an aneurism of the aorta when its walls are weakened by chronic disease. **Syphilis,** as the cause of a specific form of arteritis, is frequently concerned in the etiology of aneurism.

The **symptoms** of aortic aneurism are chiefly those dependent on pressure of the tumour on adjacent parts or organs, and they vary, therefore, according to its situation and mode of growth in relation to surrounding structures. The dangers attending it are partly dependent on those pressure symptoms and partly on its tendency to rupture. An aneurism, for instance, affecting the arch of the aorta, situated as it is in the vicinity of most important structures, may, it is clear, in its development and growth give rise to the most serious and distressing symptoms from compressing adjacent structures, and these have to be considered in the treatment of the case, as they frequently lead to a fatal issue independently of any rupture of the sac.

The *form* of the aneurismal dilatation will greatly influence the probability of cure by suitable treatment. A *cylindrical* or *fusiform* aneurism, affecting, that is, the whole circumference of the aorta, is not amenable to curative measures, and a *sacculated* aneurism will be more or less so according as its communication with the artery is by a small or large opening.

Internal aneurisms are cured by the deposition of layers of coagulated fibrin within the sac, their

organisation and the subsequent obliteration of the sac by contraction or inflammation. The **indications for treatment,** therefore, are to lessen the force and frequency of the heart-beat, and so slow the current of blood in the aneurismal sac; to lessen arterial tension; to increase the coagulability of the blood in the sac. By these means we may hope to promote obliteration and contraction of the sac, when the anatomical conditions are favourable.

Various methods have, from time to time, been suggested and practised for the purpose of giving effect to these indications: many of them have completely failed, and are no longer employed.

The repeated abstraction of blood with the view of reducing blood-pressure, slowing the current of blood in the sac and so favouring coagulation, was advocated by Valsalva and practised by Dr. Hope* to the extent of withdrawing 12 ounces of blood daily for sixteen consecutive days. This method was combined with a strictly limited diet and prolonged and absolute repose. But this method, instead of quieting the heart-beat, often caused cardiac excitement and irritability, and too great restriction in diet lessens and does not increase the coagulability of the blood.

Another method, somewhat analogous to the preceding, without the bleedings, has had many advocates. It consists in a severe restriction of the diet, both in solids and liquids, together with absolute rest in the recumbent position for a protracted period. It has been termed the "**rest and starvation**" method. Its objects are to reduce the quantity and fluidity of the blood and so increase its coagulability, to lessen intra-arterial tension, and to reduce greatly the frequency of the heart-beat.

Tufnell, who adopted this method with some success, pointed out that for this treatment to be successful three conditions were essential: first, the aneurism must spring from the front of the vessel;

* Dujardin-Beaumetz, "Clinique Thérapeutique" (fifth edition), vol. i., p. 195.

second, the sac must be perfect; and third, there must be a fibrinating power in the blood. He limited the quantity of fluid taken to 8 ounces in the day—2 ounces of milk or cocoa at breakfast, 4 ounces of water or light claret at dinner, and 2 ounces of milk or cocoa at tea or supper. There is, however, in practice, great difficulty in keeping the fluids down to this limit, and some patients find the thirst attending the attempt intolerable. The solids were limited likewise to 10 ounces daily—2 ounces of bread and butter at breakfast, 3 ounces of cooked meat and 3 ounces of bread or potatoes at dinner, and 2 ounces of bread and butter at tea or supper.

This treatment by enforced rest in the recumbent position and the above diet was to be maintained for three months or longer. Great difficulties occur in carrying out this method. Certain temperaments bear the enforced rest badly: they become introspective and fretful, and the heart's action becomes hurried and irritable instead of being quieted. Others become weak and anæmic, and the injury to the general nutrition they suffer seems to aggravate their condition and to promote the further advance of degenerative changes. In such instances this method should be abandoned or greatly modified. In fairly strong and vigorous patients of calm and placid temperament, successful results may, no doubt, occasionally be obtained from this treatment. In applying this system it is important to see that the patient's bed is comfortable, that the surroundings are cheerful, and that he is spared all worry and excitement. The tendency to constipation which necessarily attends this method must be overcome by suitable aperients or enemata, as straining at stool must not be permitted, and sexual intercourse must, in all cases, be strictly forbidden.

A modification of this method, in which the patient is kept as much at rest as is consistent with his comfort and general health, the consumption of liquids is restricted to the quantity absolutely

necessary, and a somewhat greater quantity and variety of food are permitted, will be found to be attended with as much or even greater benefit in the majority of cases.

One of the most generally accepted methods of treatment of aortic aneurism, and that from which we have ourselves obtained the best results, is the administration of full doses of **potassium iodide**, together with a careful mode of living, especially as to diet and exercise. The dose should be from 10 to 20 or 25 grains three times a day. Some difference of opinion exists as to the dose that should be given. Some consider 15 grains three times a day the limit, others think better results are obtained from larger doses; 15 grains three times a day we have found sufficient in many cases, but in others we have not obtained the best results until we have increased the dose to 30 and even 40 grains thrice daily.

Amendment is often observed to speedily follow the institution of this treatment; pain is relieved, the force of the pulsation in the aneurism is distinctly lessened, and the area of dulness diminished, and in some cases complete consolidation of the sac seems to be induced. It is somewhat difficult to explain the mode of action of this remedy. Balfour thought it exerted a special influence on the wall of the sac, causing thickening and contraction. It certainly lowers blood-pressure and so favours contraction of the sac by relieving tension within it. It has been suggested that it may thicken the blood by increasing the secretions, especially that of the kidneys.

One great advantage of this treatment is that it does not necessarily demand a cessation of all occupation, and one of our own patients, an enthusiastic and restless musician, conducted a large orchestra for many years with a large aortic aneurism, while taking 40 grains of potassium iodide thrice daily.

In determining the dose most suitable to each case, one should be guided by the pulse-rate; if the

larger doses increase the pulse-rate, we should return to the smaller ones.

The *sodium iodide* has been recommended by *Huchard* as less depressing and better tolerated than the potassium iodide, and it may be employed when any difficulty is experienced in taking the latter.

Calcium chloride, which has the property of increasing the coagulability of the blood, has also been given for the cure of aneurism, and good results have been reported, but we doubt if any reliance can be placed on it as a remedy.

The known coagulating power of the **electric current** on albumen has led to its application in the treatment of aneurismal tumours, with the object of producing coagulation within the sac. The electrolytic treatment of aneurism has been extensively applied, and much was hoped from it, but it has lost some of its repute since the potassium iodide treatment has been found to be attended by such good results.

This method is, however, still occasionally applied, especially to aortic aneurisms in which the sac projects considerably on the surface. Two, three, or more needles, according to the extent of the sac, should be introduced, and they should be directed rather towards the periphery of the sac than towards the aorta, as it is of great importance to avoid the formation of a coagulum near the general blood current. The needles must be covered at their upper part with a protective non-conducting coating, to avoid the corrosive action of the electric current on the tissue pierced by them. The needles may, in the case of a large sac, be introduced into different parts of the sac at different sittings. It seems best to connect the needles with the *positive* pole only, as the clot formed is firmer than with the negative pole, and to apply the latter connected with a larger copper electrode to the adjacent surface.

The sittings should last for ten to fifteen minutes, and the strength of the current should not exceed 10 to 20 milliampères. In some successful cases there

have been as many as thirteen sittings at intervals of three to six days.

In this, as in all other methods of treatment, the more completely sacculated the aneurism is, and the narrower is its orifice of communication with the aorta, the better are the results likely to be.

The introduction of *foreign bodies* into the sac of the aneurism, with the view of promoting coagulation in it, such as considerable lengths of watch-spring, of iron or silver wire (with or without electricity), of horse-hair, etc., need not detain us, as the effect of these methods of treatment has been, in most cases of aortic aneurism, disastrous.

A case has, however, been reported by Mr. Langton* of aneurism of the abdominal aorta which was successfully treated by the introduction of silver wire into the sac. Laparotomy was first performed, and the aneurism was found to be a saccular one projecting from the anterior part of the aorta, an anatomical condition altogether favourable for the operation. Even in this case alarming symptoms occurred about three weeks after the operation, and Mr. Langton remarked that "it was only by prompt and active treatment that the case was not relegated to the long list of failures."

The method of **distal ligature,** that is, the application of a ligature to the vessel (or its branches) beyond the aneurism, and not between it and the heart, has been suggested and applied in cases of aneurism of the aorta and the innominate. Ligature of the left carotid has been undertaken for aneurism of the aortic arch, and ligature of both the right subclavian and carotid for aneurism of the innominate or of the first part of the aorta. When cure of the aneurism follows this operation, it has been suggested that it is through the formation of a clot on the proximal side of the ligature, and the extension of this down the artery into the sac. It is only applicable to a very limited number of cases, and should not be

* *Transactions* of Clinical Society, vol. xxxiii., p. 136.

resorted to in any case until other less serious methods have been tried and have failed to arrest the progress of the aneurismal tumour; twenty-three out of thirty-five cases in which this operation was performed "died outright, or were hastened to a fatal termination by the operation."* A cure is said to have resulted in six of these cases, but *temporary arrest* would seem to be the fitter term to apply, as a survival of 4½ and 3½ years is scarcely the same thing as a *cure.*

It is unsuitable in cases in which there is evidence of general atheroma or of valvular cardiac disease, or of any visceral complication. It is most promising in distinctly sacculated cases arising suddenly from over-exertion or injury.

The method of **proximal pressure**, *i.e.* pressure applied to the aorta between the heart and the aneurism, has been applied successfully in a certain number of cases of aneurism of the abdominal aorta; the object of the operation being to slow or obstruct the blood current sufficiently to allow of coagulation within the sac, and so cause its obliteration.

The cases in which this method has been successful have been healthy young men in whom, it may be assumed, the rest of the vascular system was free from disease, and in whom the local disease probably originated in injury or over-exertion. The method of operating is as follows: the patient being anæsthetised, a Lister's tourniquet is carefully adjusted in position over the abdominal aorta and above the tumour, and slowly screwed down, care being taken to avoid, as much as possible, injury to the intestines. The aorta is compressed until all pulsation in the aneurism and in both femorals is arrested. The lower limbs are at the same time enveloped in cotton-wool and flannel, and kept warm by hot-water bottles. In Mr. Durham's successful case the compression was maintained for 10½ hours. Greenhow had a successful case in which the abdominal aorta was compressed

* Pepper's "System of Practical Medicine," vol. iii., p. 819.

first for three-quarters of an hour, again for 4 hours, and again, after some days' interval, for 8 hours.

This method is quite unsuited to cases associated with general arterial degeneration, for by shutting off the blood from the lower half of the body the tension in the arteries of the upper half becomes extreme; it is a method obviously attended with grave risks, and in a considerable proportion of the cases in which it has been applied death has resulted directly from the effect of the operation; it would seem to be suitable only to those cases in which, the rest of the arterial system being healthy, the tumour is rapidly enlarging, and when milder means have failed to arrest its growth.

Dr. MacEwen has described a method of producing what he terms "White Thrombi" within the aneurismal sac by the process of inflammation excited in the wall of the sac by irritation with the point of a pin passed into the sac with strict antiseptic precautions, and carried across it until it reaches the opposite wall, where it is left for some hours, so that the movement imparted to it by the blood current may cause it to scratch the surface of the sac and excite the necessary amount of irritation. Different parts of the sac may be acted upon by the same needle without its withdrawal. He believes that this illustrates an important principle in attempts to procure consolidation of an aneurismal sac; the cases he cites in support of his views, although but few in number, appear to merit further consideration, and the method he describes has this to recommend it —that it is easy to carry out, and involves none of the serious risk which attends most other surgical modes of treatment.*

The administration of *ergot* in large doses, and the hypodermic injection of *ergotin*, have been advocated in the treatment of aneurism, the former

* For full details of this method we must refer to Dr. MacEwen's paper, which will be found in the *British Medical Journal* for Nov. 15th and 22nd, 1890.

by Sibson and the latter by Langenbeck; both these authorities appear to have thought that this drug could cause contraction of the sac by its action on the muscular fibre in its walls, but repeated examination has demonstrated the absence of muscular fibre in the coats of the aneurism. It has, however, been maintained that ergot, when given in large doses, does diminish the volume of the aneurism and greatly lessens its pulsation,* and that it acts by diminishing the ventricular diastole, and limiting the output of blood. On the other hand, the rise of blood-pressure which attends the use of ergot would seem to counter-indicate its administration in internal aneurism. It is certain that this method of treatment has gained few supporters.

Recently Lancereaux has advocated the subcutaneous injection of *gelatinised serum* in the treatment of aneurism, in the belief that the gelatin is absorbed and increases the coagulability of the blood. This method may be carried out by the subcutaneous injection (the best situation is in the intermuscular tissue in the buttock) of 3 ounces of a 2 per cent. solution of gelatin in normal salt solution warmed and sterilised. These injections may be given every other day; some give a series of 12, and then wait for a time and give another series. As many as 60 injections have been given in the same case.

The value of this method has been very variously estimated. Good results have been published in France, Italy, and Germany, and failures have also been numerous. In this country very few successful results have been obtained. There seems to be little doubt that its application has, in certain instances, been followed by some relief of the subjective symptoms, together with a diminution in size and pulsation of the sac. But very serious and even fatal symptoms have followed its employment in a

* Sir Wm. Broadbent, *Transactions* of the Medical Society of London, vol. xiii., p. 133.

number of instances, and much pain is caused locally by the injections. Emboli seem to be caused and carried into the circulation in some cases. Clotting of the blood may occur in other parts of the vascular circuit than the aneurismal sac, especially in some of the veins where the circulatory flow is languid. Altogether the method appears to be attended with such serious risks that we cannot recommend its adoption.

Huchard's experience of this method is that it is *insufficient*, and he prefers to put his trust in remedies which diminish arterial tension, such as potassium iodide associated with *erythrol tetra-nitrate*. He also objects to a meat diet on account of the toxins in animal food, which he maintains have a powerful vaso-constrictor action, and he strongly commends an absolute milk diet.

Fraenkel has called attention to the great value in syphilitic cases of mercurial inunctions, with a milk diet, rest in bed, and the local application of the ice-bag.

The application of **ice** or of refrigerating mixtures to the aneurismal tumour, when it projects on the surface, has been advocated not only for the purpose of allaying pain, but with the idea that it may possibly promote coagulation; and, no doubt, if applied over the region of the heart, it tends to moderate its action. But, as has been pointed out by Dujardin-Beaumetz, cold retards and does not promote coagulation, and he is disposed to refer whatever beneficial results have been found to follow these applications either to a contraction of the sac, or rather to inflammation in it caused by the prolonged application of cold. He also calls attention to certain dangers attending these applications, such as diminished vitality of the skin, when external rupture is imminent, and pulmonary congestion and bronchitis from chill. We have ourselves very thoroughly tried the protracted local application of ice to thoracic aneurisms projecting from the chest

wall, but, beyond a temporary reduction of the frequency of the heart-beat, we have not been able to observe any curative effect.

In the course of aortic aneurism many very painful *symptoms* arise, calling urgently for relief and palliation. The *relief of pain* may require the hypodermic use of morphine and atropine, and the local application of opium or belladonna liniments or plasters. Phenacetin and antipyrin have both been found very useful as analgesics in these cases. Inhalations of chloroform may be needed when pressure on the air-passages causes distressing dyspnœa. We have found small bleedings of value in relieving venous distension and some forms of painful dyspnœa. Tracheotomy or intubation may occasionally be needed, but this operation is only calculated to be of use when the urgent dyspnœa is laryngeal and due to bilateral abductor paralysis; most commonly the dyspnœa is due to pressure on the trachea near its bifurcation, and can only be relieved by anæsthetics. Anginal attacks may be relieved by nitroglycerine, and barium chloride has also been found useful for the same purpose in doses of $\frac{1}{10}$th of a grain thrice daily. Great comfort has been derived, in certain situations of the external tumour, from a well-applied elastic support.

ADDITIONAL FORMULÆ.

Pills for arterio-sclerosis with feeble heart.

℞ Sodii iodidi, ʒj.
Sparteinæ sulphatis, gr. xv.
Pulveris glycyrrhizæ, q.s.

Ut f. pil. xl. Four to six daily. (To be kept in a dry place.) (*Huchard.*)

Hypodermic injection of ergotin in aneurism.

℞ Ergotin (Bonjean), gr. xl.
Spiritus vini rectificati, ♏lxxx.
Glycerini, ♏lxxx.

M. f. solut. Inject three centigrammes under the skin over the tumour. (*Langenbeck.*)

Combination of iodide and bromide in aneurism.

℞ Potassii iodidi, ʒij.
Sodii bromidi, ʒij.
Syrupi floris aurantii, ʒiv.
Aquæ, ad ℥vj.

M. f. mist. A tablespoonful three times a day. (*Jaccoud.*)

For aneurism.

℞ Potassii iodidi, ʒiij.
Infusi chiratæ, ℥vj.

M. f. mist. A tablespoonful three times a day. (*Balfour.*)

For the cough of aneurism.

Morphinæ hydrochloridi, gr. j.
Acidi hydrochlorici diluti, ♏v.
Acidi hydrocyanici diluti, ʒss.
Syrupi scillæ, ℥j.
Aquæ, ℥j.

M. f. mist. A teaspoonful occasionally. (*Balfour.*)

Or

℞ Syrupi scillæ, ʒij.
Spiritus lavandulæ compositi, ʒiv.
Tincturæ opii ammoniatæ, ʒiv.
Syrupi simplicis, ℥j.
Aquæ menthæ piperitæ, ℥ij.

M. f. mist. A tablespoonful every three hours, and 15 minims of chlorodyne in addition when required. (*Balfour.*)

To relieve the pain and restlessness of aneurismal pressure.

℞ Morphinæ hydrochloridi, gr. ¼ ad ½.
Spiritus ætheris sulphurici compositi, ʒss.
Aquæ menthæ piperitæ ad ℥j.

M. f. haust. To be taken occasionally.

To relieve aneurismal neuralgia.

℞ Extracti belladonnæ, gr. lxxv.
Extracti opii, ʒj.
Spiritus vini rectificati, ʒss.
Glycerini, ℥ss.

M. f. lin. To be applied externally to the painful part.

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CHAPTER VII.

THE TREATMENT OF ANÆMIAS.

ANÆMIA: Definition—Some physical Characters of Healthy Blood and of Red Blood Corpuscles.
Anæmia, Secondary or Symptomatic. *Chlorosis*—Causation—Symptoms—*Treatment*—(1) Dietetic, (2) Hygienic, (3) Medicinal. Aperients. *Iron*, its various Preparations and Modes of Administration—Natural Chalybeate Waters and Baths—*Manganese*—*Arsenic*—*Oxygen Inhalations.*
Pernicious Anæmia.—Characters—Blood Changes. *Treatment*—Arsenic in large Doses—Massage—Diet—Bone-Marrow—Transfusion—Antiseptics—Serum Treatment. Additional Formulæ.

By **anæmia** is meant either a reduction in the whole volume of blood or a reduction in the number of red corpuscles, or a reduction in its most important constituent, the *hæmoglobin* or colouring matter of the corpuscles. It is chiefly a "poverty of the blood in normal functional red corpuscles."

A few facts with regard to the physical characters of the blood, and the life-history of the red corpuscles, had better be stated before we approach the subject of the treatment of the several forms of anæmia.

The specific gravity of healthy blood varies between about 1040 and 1070, that of the plasma alone, without the corpuscles, between 1026 and 1029. It has a distinctly alkaline reaction. The average size of the red corpuscle is 7·5 μ (micro-millimetres) in diameter, and the range in health varies between 6·5 and 9 μ. In embryonic and infantile life the range is greater, viz. from 2·5 to 14 μ. The smaller have been termed *microcysts*, the larger *megalocysts*.

The red corpuscles have no distinct membrane, but consist of a stroma, composed of globulin, coloured with a red pigment, the **hæmoglobin.** This is only loosely combined with the stroma, and can be split up into an albuminate and a red pigment which is termed

hæmatin. The depth of colour of the red corpuscles, and their functional activity, depend on the amount of hæmoglobin they contain.

The average number of red corpuscles in healthy blood is 5,000,000 per cubic millimetre, but the number may range between 5,500,000 and 4,000,000.

Nucleated red corpuscles are found, normally, only in the embryo, and it is generally admitted that a nucleated red blood corpuscle is the immediate antecedent of the fully-developed non-nucleated one. The red corpuscles are now believed to originate mainly in the bone-marrow, and only to a slight extent in the spleen and lymphatic glands. Observers are not agreed as to the precise manner in which they originate in the marrow, nor as to the part, if any, taken in their formation by the white blood cells. It is thought that only in the case of exceptional demands on the blood-forming functions is there any formation of red corpuscles in the spleen or lymphatic glands.

The average life of a red blood corpuscle has been estimated at fourteen days. The precise manner in which it undergoes disintegration is not known. Its destruction would, however, appear to take place chiefly in the portal vessels, and the spleen and gastro-intestinal mucous membrane seem to be the most active seats of blood destruction. The liberated hæmoglobin is carried to the liver, and there converted into pigment. The only other seat of blood destruction, so far as is at present known, is the bone-marrow.

In anæmia the number of red blood corpuscles, and the amount of hæmoglobin contained in them, may vary very greatly: the red corpuscles may be reduced to between 30 and 20 per cent., and the gravity of the case will depend on the amount of the loss. Hayem has reported a case, following puerperal hæmorrhage, in which the number of red blood corpuscles fell as low as 850,000, or only 17 per cent., and in which the patient recovered.

It has been customary to classify anæmias into (*a*) *symptomatic* or *secondary*, *i.e.* those cases in which the anæmia is rather a symptom than a disease, owing its existence to the presence of other morbid states, and (*b*) *primary* or "*idiopathic*" anæmias, including *chlorosis* in the latter. But this classification is, in the present state of our knowledge, of doubtful accuracy, and for therapeutic purposes we may consider the treatment of the ordinary forms of symptomatic anæmia together with that of chlorosis.

Any disease or injury which leads to *hæmorrhage* must reduce the quantity of the blood and so cause anæmia; so also any disease which interferes directly or indirectly with the process of blood formation, or is attended with abnormally active blood destruction, must also be attended or followed by anæmia. In hæmorrhagic cases the loss may be rapid and sudden, or gradual and continuous. Successive hæmorrhages, at intervals, are found to be more dangerous than a single hæmorrhage exceeding them in amount, as they interfere more with the regenerating processes. In some cases of large hæmorrhage the regeneration of the blood is very rapid—a week or ten days being adequate to reproduce the normal amount. The corpuscular elements are, however, restored much more slowly than the watery, saline and albuminous constituents, as these are readily absorbed from the gastro-intestinal tract. The hæmoglobin also is restored more slowly than the corpuscles. Besides the direct loss of blood from hæmorrhage, other morbid states may cause anæmia, such as chronic suppuration, albuminuria, hyperlactation, rapidly-growing neoplasms, cancer, etc.

Or the defect may lie in the direct or indirect supply of blood-making material to the organism—as inanition from insufficient or unsuitable food supply; or from assimilative difficulties, as imperfect mastication, œsophageal obstruction, gastric cancer, or chronic dyspeptic states.

Or the functions of the assimilative and blood-

making organs may be disturbed by acute febrile or chronic wasting diseases, and anæmic states follow the former and accompany the latter; but in such instances the treatment of the anæmia is but a part of the general management of these diseases.

The **symptoms** that may be observed in cases of severe symptomatic anæmia are pallor of the countenance, and especially of the visible mucous membranes; loss of pink colour of the nails; digestive disturbances, such as loss of appetite, vomiting, gastralgia, *constipation;* palpitation and breathlessness on exertion, often with increase of cardiac dulness, owing to dilatation; the presence of murmurs over the heart and large vessels. The dyspnœa is due in part to cardiac feebleness and in part to the deficiency of oxygen-carriers in the blood; some œdema of the feet and ankles often occurs at night and disappears after rest in bed; the nervous system generally presents some signs of irritability, and hysterical manifestations are not uncommon, together with a tendency to neuralgic attacks; in acute anæmia from large hæmorrhages delirium and convulsions may precede fatal coma. Slight pyrexial states may occasionally occur, but they are far more common in the other forms.

Anæmic states, however caused, are attended with a tendency to hæmorrhage, particularly to retinal hæmorrhage, dependent on the extent of the corpuscular loss, especially when this exceeds 50 per cent.

Chlorosis is the term applied to a clinical form of anæmia usually regarded as less directly traceable to any antecedent disease than the secondary form, and although it has many features in common with the cases we have just been describing, it has other well-marked characters which we will briefly describe.

Chlorosis is almost always a disease of young girls, especially between 14 and 17 years of age. Its causation is doubtful, but it seems often to be associated with sexual disturbances, such as amenorrhœa, dysmenorrhœa, leucorrhœa, and with hysterical states,

but these may be sequences and not antecedents of this disease. Lack of exercise and fresh air, emotional disturbances, the absorption of leucomaines and ptomaines from the large intestine as a consequence of habitual constipation, have all been suggested as possible causes.

Stockman* maintains that it "does not arise from excessive destruction of red corpuscles, but is due to deficient formation or to actual loss of blood," and that "exact researches have demonstrated the absence of any special sepsis in the alimentary canal." His conclusion is "that the *direct* causes of chlorosis may be reduced to *two*, viz. insufficient supply of iron in the food and loss of iron from the body by menstrual or other bleeding." The onset of puberty and the consequent strain of rapid growth and development are important determining influences.

Hereditary influence has also been invoked. Virchow has gone so far as to attribute it to a developmental defect in the circulatory system, but that is inconsistent with the transitory and curable nature of the malady.

The general symptoms resemble those we have described as common to moderately severe forms of secondary anæmia; the complexion is, however, of a *yellowish green colour*, and not merely pale, as in anæmia; the skin occasionally shows areas of pigmentation, especially about the joints; the eyes are peculiarly brilliant, and the sclerotics sky-blue. We have already spoken of the breathlessness, palpitations, faintings, cardiac and vascular murmurs, neuralgias, digestive feebleness, constipation, œdema of the feet, which are common to this and symptomatic anæmia. In chlorosis, especially, the subcutaneous fat is well maintained, and the patients have an aspect of plumpness.

But it is in the characters of the blood that the chief differences are found between this and the other form of anæmia. In chlorosis the red corpuscles may

* Hare's "System of Practical Therapeutics," vol. i., p. 677.

be scarcely at all reduced in number, but they are very poor in hæmoglobin. It is the hæmoglobin which is deficient in this disease, and it may be reduced to from 60 to 30 per cent. of the normal.

In the more severe cases the red corpuscles are also diminished, but the hæmoglobin is always disproportionately reduced. Cases have been observed in which the globular richness was over 85 per cent., and the hæmoglobin only 35 per cent.

Another character of the blood in chlorosis is the frequent great inequality in the size of the corpuscles; many are much smaller than normal, 3 to 6 μ, and a few are larger. There may be a slight increase of leucocytes. Unlike other forms of anæmia there is little liability to hæmorrhage; optic neuritis is, however, often present.

The **treatment** of *chlorosis* and the anæmic state will be best considered from three points of view: (1) dietetic, (2) hygienic, and (3) medicinal.

1. A defective or unsuitable food supply is one of the most frequent causes of anæmia. With a diet composed exclusively of non-nitrogenous food it has been proved that the percentage of hæmoglobin in the blood undergoes a notable diminution, while it is augmented by a diet rich in albuminates. Defects in this respect will often be found in the dietaries of girls' schools, where anæmic conditions frequently become developed. Growth and development, so exceedingly rapid in girls as the period of puberty approaches, can only take place by the agency and at the expense of the nutrient fluids and their active elements, especially the red corpuscles, and these require a frequent and abundant supply of nutritious food for their constant regeneration. In hæmorrhagic cases recovery is often very rapid with suitable food, and the loss of blood, especially its fluid part, is soon repaired. But not only must we see that there is an adequate and suitable supply of food, we must also look to its digestion and assimilation. The digestive secretions in these cases are apt

to be defective, both in quantity and quality. It has also been noticed that in anæmic persons the conditions of normal metabolism are somewhat modified, and especially that there is increased metabolism of the albuminates with an increased secretion of urea; but the metabolism of fat appears to be diminished, and while their muscles are feeble and wasted, they have a plump appearance from the presence of an abundance of adipose tissue; this has been referred to defective oxygenation, due to decrease in the red corpuscles, and consequent imperfect combustion of the fats and carbohydrates.

The food should at first be in small or moderate quantity, so as not to overtax the feeble digestive powers, and it should be in a readily digestible form. Milk, when easily digested, and cream, and all forms of animal food, presented in a form easy of digestion, are useful. Raw or slightly cooked meat, reduced to pulp, and mixed with a little pleasantly-flavoured *consommé* or broth, is of value as a blood restorer. G. Sée gave as much as 14 oz. of raw meat daily in cases of chlorosis, and this with hydrotherapy he stated he had found succeed as a blood restorative after iron had failed. The digestive power for nitrogenous or other foods must be carefully watched, and, if necessary, aided by a few grains of pepsin and a few minims of dilute hydrochloric acid.

Besides animal albuminates, which should predominate in the diet at first, some easily digestible fat, especially if there has been any loss of flesh, should be added; progress in blood-making will often fail to take place until some digestible fat is added to the dietary. A moderate amount of butter or cream, or a dessertspoonful of cod-liver oil daily, may be ordered. The yolk of egg is an easily digested form of food, rich in iron. In anæmia with cardiac feebleness and loss of appetite, the yolks of two or three eggs, beaten up with a little boiling water and flavoured with sugar and some spice, and with a tea-

spoonful or two of brandy added, is an excellent concentrated form of nourishment.

Bauer remarks "that the reproduction of the most essential components of the blood, especially of the red corpuscles, would be greatly favoured if relatively more albumen were consumed in the food of such patients than is proper under physiological conditions."* Food must be presented to such patients in an attractive and palatable form, especially when there is great indisposition to take food from entire loss of appetite. In such circumstances pleasantly-flavoured fluid or semi-fluid foods, not requiring mastication, must be our chief resource. A certain amount of wine, such as good sound Burgundy, with or without water, will be found useful, both as a stimulant and a sedative; or a glass of porter or stout may sometimes be taken with advantage at bed-time, with a biscuit or some bread and butter.

2. Not less important is attention to the personal *hygiene* or *habits of life* of the patient. One of the most important of these is a life passed much in the open air in a salubrious rural district, or by the sea-side. Still greater improvement is often observed by a residence in elevated health resorts, of which there are many in Switzerland ranging from 3,000 to 7,000 feet above the sea level. Free exposure to the vivifying influence of sunlight and good air is one of the best blood restoratives we have. Hence it proves of great advantage to anæmic patients to be able to pass the winter in a climate where it is possible to be much in the open air, for such patients often tolerate badly exposure to cold and inclement weather, and when we advocate a life in the open air we wish to be understood to mean under genial climatic conditions. Such patients are often urged to take more physical exercise than they are able to without incurring injurious fatigue and exhaustion; and at first, at any rate,

* "Dietary of the Sick: (Diet in Anæmia and Hydræmia)," p. 275.

it is best to restrict them to passive motion through the air, as in driving or sailing, and when some progress has been made in blood regeneration, to gradually encourage walking or riding exercise with a certain limited amount of interesting gymnastics. But with young and *growing* anæmic girls it will generally be found that *enforced rest* will often start an improvement that exercise has failed to bring about, and in such cases we often insist on an extra hour or two in bed of a morning, and an hour or two's repose in the afternoon, with the most manifest advantage. Many of these cases, standing as they do on the border-land between pure anæmia and neurasthenia, require somewhat the same management as the latter, and massage and passive movements, together with electrical stimulation of the muscles, may be needed.

The usefulness of baths and the application of the methods of hydrotherapy to the cure of anæmia have had many advocates, and we are greatly in favour of a judicious use of these methods in cases of anæmia which are found to be making but slow progress towards recovery. The application of douches and affusions to the skin, at first warm and then the temperature gradually reduced, or cold sprinkling of the surface, and especially of the spine, following warm affusion, and then brisk friction, is a great stimulant to nutrition and circulation and a calmative to the usually irritable nervous system. Such applications, combined with gentle massage, are of especial value in cases associated with insomnia. Care in diet, a life passed much in the open air, a careful apportionment of rest and exercise, the judicious use of hydrotherapy and massage, the strict limitation of both mental and physical work, the removal of all causes of emotional strain or excitement, and cautious inquiry into and correction of any possible sexual aberrations (for the evil habit of masturbation is a fruitful source of anæmia in both sexes), these are the principal hygienic means for the restoration of a normal blood state.

3. We must in the next place consider the **medicinal** agents which are best calculated to promote blood regeneration. In the first place we will dispose of the question of the value of aperients. When there is constipation, and this is a very common accompaniment of anæmic states, its removal must occupy the first place in our medicinal management of the case. We have not seen reason to believe, as has been urged, that constipation frequently stands in a causal relationship to anæmia. The cases which we have been accustomed to regard as cases of fæcal intoxication, induced by chronic constipation, we should place in a different category, and indeed we have in a former chapter alluded to them; anæmia is certainly present in many of these cases and can only be remedied by remedying the constipation. But we have never yet found those physicians who say they would prefer aperients to iron, in the treatment of anæmia, carry their preference to the extent of prescribing aperients only and withholding iron! Nor do we think if they began this method they would long adhere to it. We say this the more unhesitatingly because we have always advocated and practised the free use of aperients, in conjunction with iron and other remedies, in all cases of anæmia where constipation existed. But not in others. In some cases with irritable bowels, and no tendency to constipation, we have often found a combination of bismuth and iron answer far better than iron alone. The reason why aperients are of such undoubted value in cases of anæmia with constipation is obvious. They promote the activity of nutritive changes in a most direct manner, they remove abdominal congestions and quicken the sluggish circulation through the portal and other portions of the vascular system of the alimentary canal, they stimulate the action of the liver and of all the abdominal glands, they thereby increase the quantity and improve the quality of the digestive secretions; at the same time they sweep away any toxic substances which may possibly be formed from retained

fæculent matter, and which might be absorbed into the blood; and further, no doubt the excessive development of sulphides from the decomposition of retained fæces leads to the formation of insoluble iron sulphides, and so the iron in the food or that taken as medicine is wasted and lost. We see, then, what important agents aperients are in promoting blood regeneration when chronic constipation is associated with anæmia.

The bowels, then, must be kept adequately relieved, but in very obstinate cases we have found it far better to discard all aperients by the mouth and to trust to long tube enemata of simple water, or soap and water, with abdominal massage. Having succeeded by suitable methods in overcoming the constipation, we should, in our further treatment, take measures to prevent its return, and to maintain the due and regular activity of the bowels; for this purpose it is often a good practice to combine some aperient with such preparations of iron as we may select.

Iron, in the various forms at our disposal, is still, and probably always will be, the chief medicinal remedy for ordinary anæmic states. We are not able to say in what precise manner iron acts as a blood restorative; it has been stated, on experimental grounds, that all the *iron* given by the mouth may be recovered from the fæces; such statements have been received far too readily, and it is difficult to conceive such a series of experimental observations ever having been devised as would justify such a sweeping statement. It is something worse than foolishness to make such inferences from the results observed after injecting iron into the blood-vessels of dogs and rabbits. But it has been conclusively shown that inorganic iron salts are absorbed by the mucous membrane of the bowel, although the amount is always small, a few milligrammes a day. "After absorption it seems to be stored up in the liver, and to be converted into organic compounds resembling

hæmoglobin in constitution, but more simple; and these ultimately form the hæmoglobin of the red blood corpuscles."* It must, of course, be admitted that in cases of anæmia iron may be absorbed from the food in sufficient quantity to restore the loss of red corpuscles and hæmoglobin, and that therefore an abundance of good food and good air and other hygienic conditions may be attended by recovery, without the use of preparations of iron, or even after iron preparations may have failed. But these are exceptional instances, and some of the more severe and more intractable forms of anæmia will be found to arise in the midst of the very best hygienic surroundings, and will only recover when some suitable form of iron is administered, and administered for a long period.

We have pointed out that it is not impossible that the preparations of iron, taken as medicine, may, by combining with the sulphides formed in the intestines, preserve the iron in the food from decomposition and waste.

It is well known that it is by no means a matter of indifference what form or preparation of iron is used in different cases of anæmia, and nothing is more common than to find a particular preparation succeed after many others have failed. In the first place we should examine carefully into the state of the digestive functions; if, with a coated tongue, there is loss of appetite, flatulent distension, and other signs of dyspepsia, we must endeavour to improve the digestion before we prescribe any form of iron, and some such formula as the following should be ordered:—

℞ Liquoris bismuthi citratis ℥iv.
Sodii bicarbonatis ℥ij.
Spiritus ammoniæ aromatici ℥iij.
Tincturæ nucis vomicæ ℥v.
Infusi calumbæ ad ℥viij.
Misce, fiat mistura. Two tablespoonfuls an hour before

* Stockman, in Hare's "System of Practical Therapeutics" (new edition), vol. i., p. 680.

food twice a day. If there is constipation the following pill should be given daily, immediately before or after dinner :—

℞ Aloes extracti gr. jss.
Ipecacuanhæ pulveris gr. ss.
Quininæ sulphatis gr. j.
Saponis gr. ss.
Misce, fiat pilula.

Orexin tannati in 6 grain doses, given an hour before meals, has been reported to be of great service in some cases of anæmia with loss of appetite and emaciation.*

After a week or ten days of this treatment, we shall usually be able to begin with one of the milder preparations of iron, and we may then add 5 grains of the ammonio-citrate of iron to each dose of the above mixture, and a grain of ferrous sulphate to each of the pills. Subsequently we may be able to replace the mixture with a modification of Blaud's pills, which we have found most useful. In the modification which we use, we do not attempt, nor desire, to decompose the whole of the ferrous sulphate by potassic carbonate, but to leave an excess of sulphate in the pill; we have no doubt of the superior efficacy of the following formula to that commonly used :—

℞ Ferri sulphatis exsiccatæ gr. lxxij.
Potassii carbonatis gr. xij.
Pulveris nucis vomicæ gr. xxiv.
Saponis gr. vj.

Misce et divide in pilulas xxiv. To be coated with a suitable covering. One to three after each meal. In ordinary cases in which, as is the rule, constipation is a prominent symptom, the following modification of a very old formula is one of the most efficacious and rapid blood restorers we are acquainted with :—

℞ Ferri sulphatis gr. xvj.
Acidi sulphurici diluti ♏xl.
Liquoris strychninæ ♏xlviij.
Magnesii sulphatis ℥j.
Aquæ chloroformi ad ℥viij.

Misce, fiat mistura. Two tablespoonfuls twice or three times a day, an hour before meals.

* *Lancet*, vol. i., 1900, p. 1019.

Some prefer to give the *insoluble* preparations of iron immediately or about an hour after food, in order that they may be dissolved by the gastric juice and so absorbed with the food; and in some cases where there is an intolerance of iron preparations this is a good plan. The *ferrum redactum* * in 2- or 3-grain doses may be given in pill or powder, or the *ferri carbonas saccharatus* in 5- to 10-grain doses in the same manner thrice daily after food.

The best test of the activity of any preparation of iron is now at our service in the method of counting the number of red corpuscles, and of estimating the amount of hæmoglobin during its administration. It is desirable to apply this method of estimating the effect of our remedies on the process of blood regeneration, occasionally, during the treatment.

Many other preparations of iron are of especial value. The ferrum tartaratum and the vinum ferri are useful mild preparations of iron, and the latter is often acceptable to children. The syrup of the phosphate, the compound syrup of the phosphate, and the compound syrup of the hypophosphites are all valuable forms of iron especially useful for children and young growing people. The last-named contains quinine and strychnine, and is very useful in the forms of anæmia following acute febrile and inflammatory diseases. The citrate of iron and quinine is also a very useful form in these cases, and is usually easy of digestion.

The syrup of the iodide of iron is particularly valuable in anæmias of scrofulous children with tendency to glandular hypertrophy. Lactates, albuminates, and peptonates of iron have been prepared, and prescribed with a view of presenting the iron in a pre-digested and readily assimilable form to patients who find a difficulty in digesting other forms of iron. With the same object in view, a *syrup of hæmoglobin*

* The solubility of reduced iron in gastric juice has been estimated by Quevenne. When 50 centigrammes (7½ grains) of reduced iron were treated with 100 grammes (3 oz.) of gastric juice, 51 milligrammes were dissolved, or about one-tenth.

has been prepared in France from the blood of animals. The dose of the syrup is 2 or 3 tablespoonfuls a day.

Ferratin, a combination of the iron salts with egg albumin, has recently been introduced to imitate the organic compounds of iron found in the tissues. It contains about 7 per cent. of iron, and, in doses of 15 to 30 grains a day, has been found of service as a blood restorer.

Attempts to administer preparations of iron by the hypodermic method and by rectal injection have been made, but not with any striking success.

There is one point that must not be lost sight of in the treatment of anæmias by iron, and that is that the first effect of iron is to increase the number of corpuscles without increasing to a corresponding degree the amount of hæmoglobin, that the latter is of slower regeneration and it needs a longer time to re-establish it in the normal amount; we should therefore continue the administration of iron for some time after the regeneration of the corpuscles, and, indeed, for some time after the apparent restoration to health, as relapses are exceedingly common.

Certain inconveniences sometimes attend the administration of iron, but most of them are trivial or avoidable. Constipation is said to be frequently provoked by the presence of iron in the fæces, to which it imparts a black colour, due more probably to the conversion of the iron into sulphide than into a tannate, as has been suggested, for the black colour has been found even when the diet has been exclusively of milk. We have already insisted on the necessity of combining an aperient with the iron when there is any tendency to constipation. Then it is said to stain the teeth black; this certainly cannot be the case when given in the form of pills, or enclosed in cachets, and very little risk would be incurred in taking the fluid forms of iron if the mouth were well rinsed out with pure water before and after the dose; and by pouring the dose well into the throat there need be little or no contact with the teeth.

Gastralgia has also been said to be provoked by preparations of iron, but this is scarcely possible if the preparation selected be a mild one, and the dose given small or moderate. We are aware there is a prevailing belief that large doses are necessary in the treatment of severe forms of anæmia, but we are satisfied that great care in the selection of the preparation, and in its mode of administration, will often avoid the necessity of those large doses, and we shall insist immediately on the activity of very small doses of iron, when given in the form of natural mineral waters. Dujardin-Beaumetz showed how small is the actual quantity of iron lost by the blood even in the most advanced forms of chlorosis. According to his calculation, in a woman weighing 60 kilogrammes (a little over 9 stone) the amount of iron in the blood does not exceed 2 grammes (30 grains), and the most extreme anæmia does not reduce this amount by more than 50 centigrammes (7½ grains). But we must also bear in mind that the assimilation of iron, and the formation of hæmoglobin, are in such cases often very slow.

The efficacy of **natural iron waters**, in the treatment of anæmic states, makes it clear that the *form* and not the *quantity* of iron is of chief importance in blood regeneration. It is futile to assert, as some do, that it is the mode of life led at iron spas and not the iron water that is the chief restorative agent, because just the same mode of life can be led at any bracing seaside resort, but without the same results. No one with any knowledge of the localities would maintain that the air and life at Schwalbach were more tonic than at Folkestone, or the air and life at Spa than at Cromer or Whitby. At St. Moritz, no doubt, a very bracing and stimulating air comes to the aid of the iron cure, but many of the more feeble anæmics bear the St. Moritz cure badly, unless they are prepared for it by three or four weeks at Spa or Schwalbach; then they are enabled to benefit by the more bracing climate of

the Engadiñe, which will otherwise chill and depress them.

At these iron spas the water is richly charged with free carbonic acid, and the value of an iron spring is greatly dependent on the amount of free carbonic acid in it. When these waters are exported some of this carbonic acid is necessarily lost, and there is a great tendency in the bottled waters to deposition of the iron in the form of oxide, which detracts greatly from the value of iron waters in bottle.

Spa, Schwalbach, St. Moritz, Pyrmont, are the best known of chalybeate springs; there are many others, almost as useful, which cannot here be enumerated. Tunbridge Wells has an iron spring, but it contains very little free carbonic acid. At all these Continental spas the water, richly charged with free carbonic acid, is used for baths, and the stimulating effect on the skin and circulation these baths exercise is undoubtedly of efficacy in many cases.

It is rarely thought desirable to prescribe large quantities of these iron waters. One to two glasses (6 oz. each) about two hours after breakfast (11 a.m.), drunk slowly, slightly warmed if necessary, and at intervals of twenty or thirty minutes, and one or two more about five in the afternoon, are the usual amount, beginning with the smaller and rapidly increasing to the larger quantities.

Since many of the natural iron springs, as those of St. Moritz, contain a considerable amount of salts of lime, they occasionally cause constipation, and this must be guarded against by the use of some aperient water or salts, taken early in the morning. It is remarkable how certain anæmic patients, who do not improve with iron medication at home, appear to assimilate rapidly the iron of these chalybeate springs and quickly recover both tone and colour.

Preparations of *manganese* have been vaunted as blood restoratives equal in value to those of iron, and many physicians have combined the two, but Professor Hayem maintains, as the outcome of his

careful and elaborate researches, that they are not only useless, but injurious, as they interfere with the action of the iron salts.

Chloride of gold and sodium has some reputation in America as a blood regenerator, in doses of $\frac{1}{20}$ gr. increased to $\frac{1}{10}$ gr.

Arsenic we have not found capable of replacing iron in the treatment of ordinary symptomatic anæmias, but some interesting observations have been made by Aperti* as to the rationale of the use of iron and arsenic in the treatment of anæmia, in which it is shown that these substances act differently: while the arsenic increases the *number* of the corpuscles, the iron increases the total quantity of hæmoglobin.

Inhalations of oxygen have been advocated in refractory cases, and although they have been shown to have little direct effect in causing regeneration of the blood corpuscles, it seems probable that by stimulating the nutritive functions they may favour the assimilation of iron. *Compressed-air baths* have also been used with advantage to stimulate the respiratory and nutritive functions, and so to lead indirectly to blood regeneration.

In acute anæmia following severe hæmorrhages, *transfusion* of blood has been practised with excellent results, and in the same class of cases the subcutaneous injection of saline solutions has proved a valuable resource.

In *chlorosis* it is important to continue the administration of iron for three months or more, as there is a great tendency to relapses, and all the medicinal, dietetic, and hygienic measures we have referred to will often be needed to correct the defect.

In the febrile cases we should especially see that the bowels are freely evacuated daily, and we may combine quinine or arsenic with the preparation of iron given.

A preliminary treatment with an intestinal antiseptic, such as *β-naphthol*, before commencing the

* *Lancet*, 1900, vol. i., p. 1146.

administration of iron, has been found advantageous in certain cases.*

The addition of small doses of digitalis to the iron tonics has been found valuable in some cases where symptoms of cardiac debility were prominent.

Pernicious anæmia. — There is a tendency to regard this mysterious and remarkable disease as pathologically related to the preceding, but in its clinical features, its course, and its intractableness to almost all forms of treatment it differs very widely from it. This disease has often been observed to be preceded by symptoms of gastro-intestinal disturbance, or by nervous shock or worry, but it is usually insidious in its approach, and the first deviations from health noticed are languor and pallor of countenance, muscular feebleness, and indisposition to exertion. Feelings of faintness and breathlessness with a tendency to palpitations follow. The anæmic aspect is intensified, the visible mucous membranes become pale, and the skin assumes a waxy, "faded-leaf," or "lemon" tint, the muscles become flabby, the appetite is lost, and the signs of cardiac and general feebleness become most marked; there is usually œdema of the feet and ankles, "the patient falls into a prostrate and half-torpid state, and at length expires." Pyrexia is common though irregular, the temperature rising to 101°, 102°, or even 104°, but it rarely remains high long. The plumpness of the body is often retained to the last. Gastro-intestinal symptoms, vomiting, and diarrhœa are common. The changes found in the blood in this disease are remarkable. Its specific gravity is reduced to 1038 to 1028, its alkalinity is lessened, and the solids of the plasma are diminished. The corpuscles no longer adhere in rouleaux, and their number is greatly reduced, often below 30 per cent., and in fatal cases they have been found as low as 7·5 per cent. They also present great variations in form and size (*poikilocytosis*); some are very small (*microcytes*),

* Allbutt's "System of Medicine," vol. v., p. 515.

while a large number are above the normal size, 8 to 12 μ; the colouring matter separates readily from the stroma, and blood crystals also form readily. Another interesting point is that the reduction in hæmoglobin is not so great as the reduction in the number of the red corpuscles. Nucleated red corpuscles are constantly present. Retinal and other hæmorrhages are common. The urine is sometimes, but not always, found of a dark colour, due to the secretion of large quantities of pathological *urobilin*, and regarded by some as an evidence of excessive destruction of red blood corpuscles. This disease is supposed to be dependent on excessive blood destruction and defective blood formation.

Striking changes in the red bone-marrow have been found in this disease as well as in leukæmia. It is not within the scope of this work to enter into the consideration of pathological discussions except in so far as they may influence our views of *treatment*, but a very brief reference to the main differences of opinion that exist amongst authorities as to the nature and causation of this malady may not be here out of place. Many, like Stockman, argue that pernicious anæmia is only an extreme condition, not a special form of anæmia, that there is no real difference between it and the anæmia of hæmorrhage or wasting disease, and that its aggravated character is due to the occurrence and absorption of interstitial capillary hæmorrhages throughout the body; and Stockman would include in this group those remarkable cases of anæmia observed to occur in connection with the presence of certain parasites in the intestinal canal (Bothriocephalus latus and Anchylostoma duodenale). Hunter and others, however, hold that the anæmia of wasting and malignant disease is absolutely distinct from pernicious anæmia, that failure in blood formation plays little or no part in its production, but that the essential nature of the blood change, according to Hunter, is excessive blood destruction, the *portal blood* being the chief seat of this process.

He concludes that pernicious anæmia is an *infective* disease, caused by the presence, under certain favourable conditions, of organisms of specific nature within the gastro-intestinal tract.* He regards *oral sepsis* (dependent on dental caries) as the chief cause of the infection.

Unlike chlorosis, males are more frequently affected than females. The youngest person Osler had seen with this disease was a girl of 20, but cases in much younger subjects have been reported. Also, unlike other forms of anæmia, iron seems to have little or no remedial effect. *Arsenic*, suggested by Byrom Bramwell, appears to be the only drug that has been employed in the **treatment** of this disease with any good results. It has been given now in a great number of cases, and in many with undoubted benefit. The only difference of opinion which appears to exist as to its remedial effects is whether they are permanent or only temporary. It is usual to give it in the form of Fowler's solution, beginning with doses of 3 minims after food thrice daily, and increasing the dose every five or six days, first to 5 minims, then to 10, then 15, and finally 20 minims.

These large doses are usually well tolerated. Osler mentions a case in which the dose was gradually increased to 30 minims, and the beneficial effect persisted for nearly three years. Whenarsenic produces gastric irritation it may be administered hypodermically. It, of course, fails in some cases to produce any good effect, and there are grounds for believing that many cases reported as recoveries from the use of arsenic have subsequently relapsed; it is certain, however, that cases have remained well for from two to four years after the arsenic treatment. Its mode of action is at present undetermined. It has been suggested that it stimulates the formation of new corpuscles by the red bone-marrow. During the commencement of the treatment, at least, the patient should be kept in bed, and massage, with free

* Hunter, "Pernicious Anæmia," 1901.

exposure to fresh air and sunshine, have been found useful auxiliaries.

Prof. T. R. Fraser has recorded a case* in which he gave *bone-marrow*, with the result that the patient made a remarkable recovery. The case was a very severe one, and repeated examinations of the blood displayed all the characters of pernicious anæmia. Arsenic and iron were first administered without producing any good results. Ox and calf bone-marrow was then given to the extent of 3 oz. daily for five or six months. For a considerable part of this time salol (30 grains daily) was also given as an intestinal antiseptic. Barrs and others have also recorded instances of recovery from the use of red bone-marrow. But further experience with this substance has not corroborated these favourable views, and unless combined with arsenic, no reliance can be placed on bone-marrow.

Stockman† believes that iron is often useful in certain of these cases when combined with arsenic.

Dr. W. Carter,‡ of Liverpool, has reported a recovery in a man who was given 1 minim of solution of perchloride of mercury, 1 minim of tincture of perchloride of iron in a dram of water every hour for eight hours daily; 2 drams of desiccated ox-blood diffused in 4 oz. of water was injected into the bowel twice daily; he was also kept in bed. Afterwards he was given "*residuum rubrum*" and St. Raphael's wine.

If diarrhœa is a troublesome feature it must be controlled by large doses of bismuth—15 grains each of the salicylate and carbonate, mixed with mucilage and cinnamon water, may be given three or four times a day. Cases associated with the presence of intestinal parasites must be treated with parasiticide remedies—*thymol* for the Anchylostoma duodenale and *filix mas*

* *British Medical Journal*, June 2nd, 1894.

† Hare's "System of Practical Therapeutics" (new edition), vol. i., p. 690.

‡ *Lancet*, vol. i., 1900, p. 780.

for the Bothriocephalus latus and other tape-worms. *Transfusion* has been tried in several cases, and one or two recoveries have been reported. Human blood is alone suitable, and of this 4 to 6 oz., immediately on its withdrawal, should be mixed with one-third the quantity of sodium phosphate solution of sp. gr. 1028, and kept at the body temperature. This prevents coagulation. It should be transfused *very slowly* into one of the large brachial veins of the patient. Temporary improvement usually occurs, but it is rarely maintained.

Hunter, in accordance with the theoretical view he adopts of the cause of pernicious anæmia, advocates antiseptic treatment. The presence of oral sepsis, which he believes to be an almost constant condition, must be got rid of by the removal of carious teeth and the use of antiseptic washes. The septic catarrh of the stomach, consequent on oral sepsis, can be dealt with either by *lavage*, or, he thinks, equally well by giving such antiseptics as salicylic acid or bismuth salicylate.

If the intestine is the chief seat of trouble, such antiseptics as salol, naphthol, calomel, and mercuric chloride are indicated, and if the colon is involved, salicylic acid enemata. The diet must be adapted to the digestive capacities and peculiarities of individual cases—he leans towards milk and farinaceous foods. To combat the action of the poison in the blood after absorption, he suggests the systematic trial of *serum* treatment, and as he believes that pyogenic organisms are always concerned in the infection, he would use *antistreptococcic serum.* A successful result obtained by Dr. Elder after this treatment, in the Leith Hospital, is fully reported in Dr. Hunter's book.*

* "Pernicious Anæmia," p. 352; also *Lancet*, vol. i., 1900, p. 1198.

ADDITIONAL FORMULÆ.

Pills for anæmia.

℞ Ferri et sodii pyrophosph., ʒss.
Extracti rhei, gr. xlv.
Extracti aloes, gr. viij.
Extracti taraxaci, q.s.
Ut f. pil. l. Two to be taken night and morning.
(*Bamberger.*)

Powders for anæmia.

℞ Ferri carbonatis saccharatæ, gr. xv.
Sacchari albi, gr. lxxv.
M. et divide in pulv. vj. One night and morning.
(*Bamberger.*)

Aperient iron pills.

℞ Ferri sulphatis, gr. xx.
Potassii carbonatis, gr. xx.
Myrrhæ pulveris, ʒj.
Aloes socotrinæ, ʒss.
M. et divide in pil. xxx. Two or three a day. (*Brandes.*)

Pills for chlorosis.

℞ Ferri ammonio chloridi, ʒss.
Quininæ sulphatis, gr. xl.
Pulveris aloes, gr. xx.
Extracti taraxaci, q.s.
Ut f. pil. lx. Four to six daily.
(*Frerichs.*)

Mixture for chlorosis in the nervous and hysterical.

℞ Ferri citratis, ʒj.
Potassii bromidi, ʒijss ad ʒiij.
Vini (Malaga), ℥viij.
M. f. mist. A tablespoonful three times a day. (*Siredey.*)

Pills for the same.

℞ Ferri valerianatis, gr. xv.
Castorei, gr. xv.
Extracti rhei, q.s.
Ut f. pil. xx. Two to ten to be taken daily.
(*Dujardin-Beaumetz.*)

Mixture for chlorosis.

℞ Ferri sulphatis, gr. xxiv.
Magnesii sulphatis, ʒvj.
Acidi sulphurici aromatici, ♏xl.
Tincturæ zingiberis, ʒj.
Infusi gentianæ compositi ad ℥viij.
M. f. mist. A sixth part twice a day. (*Sir A. Clark.*)

Or

℞ Ferri sulphatis, gr. xxiv.
Sodii bicarbonatis, ʒij.
Sodii sulphatis, ʒvj.
Tincturæ zingiberis, ʒj.
Spiritus chloroformi, ʒj.
Infusi quassiæ (1%) ad ℥viij.
M. f. mist. A sixth part twice a day. (*Sir A. Clark.*)

For hypodermic injection.

A 4 per cent. solution of citrate of iron. 40 to 50 minims injected into the buttocks twice daily. When iron is not well borne, by stomach. (*Lepine.*)

Pills for anæmia with gastralgia.

℞ Ferri tartarati, ʒijss.
Extracti gentianæ, ʒij.
Extracti nucis vomicæ, gr. iv.
Extracti opii, gr. iv.
M. et divide in pilulas centum. Two before each meal.
(*Huchard.*)

Pastilles of lactate of iron.

℞ Pulveris ferri lactatis, gr. lxxv.
Pulveris sacchari, ʒiij.
"Vanille sugar," gr. xlv.
Mucilaginis tragacanthæ, q.s.
M. Divide into 100 pastilles. Two to six daily.
(*French Codex.*)

Arsenic and iron mixture for anæmia.

℞ Tincturæ ferri perchloridi, ʒvj.
Liquoris arsenicalis, ʒj.
Glycerini puri, ʒj.
Aquæ ad ʒiv.
M. f. mist. A teaspoonful three times a day in a wineglassful of water after food.
(*Whitla.*)

Quinine and iron mixture.

℞ Tincturæ ferri perchloridi, ʒvj.
Quininæ sulphatis, gr. xl.
Glycerini puri, ʒj.
Aquæ ad ʒiv.
M. f. mist. A teaspoonful in water three times a day after food. (*Whitla.*)

A combination of arsenic and iron for chlorosis.

℞ Liquoris arsenicalis, ♏xxiv.
Ferri et ammonii citratis, ʒi.
Liquoris ammoniæ fortis, ♏xij.
Spiritus chloroformi, ʒj.
Aquæ, ad ʒvj.
M. f. mist. One tablespoonful, after food, three times a day.

CHAPTER VIII.

THE TREATMENT OF CERTAIN BLOOD DISEASES: LEUKÆMIA — HODGKIN'S DISEASE — ADDISON'S DISEASE—EXOPHTHALMIC GOITRE—MYXŒDEMA.

LEUKÆMIA OR LEUCOCYTHÆMIA. Characters — Symptoms — Course—*Treatment*—Tonics—Arsenic—Sodium Cacodylate—Phosphorus — Oxygen Inhalations — Excision of Spleen—Douches—Electricity.

HODGKIN'S DISEASE, PSEUDO-LEUKÆMIA, OR LYMPHADENOMA. Characters—*Treatment*—Excision of Glands—Arsenic—Phosphorus, etc.—Animal Extracts.

ADDISON'S DISEASE. Characters—Symptoms—Indications for Treatment—Supra-renal Extract.

EXOPHTHALMIC GOITRE, GRAVES'S OR BASEDOW'S DISEASE. Characters—Course—Symptoms—*Treatment*—(1) Hygienic—Sea and Mountain Air—Hydrotherapy—Diet—(2) Local and Electrical—(3) Medicinal—(4) Surgical.

MYXŒDEMA. Character and Nature of Disease—*Treatment*—Thyroid Grafting—Thyroid Extracts—Thyroid Feeding—Iodothyrine. Additional Formulæ.

LEUKÆMIA.

Leukæmia or **leucocythæmia** is a mysterious blood disease, of the causation and intimate nature of which we have but little precise knowledge. This disease is characterised by a persistent increase of the white blood corpuscles, accompanied by considerable enlargement of the spleen and changes in the bone-marrow, **splenic** or **spleno-medullary leukæmia**, and there may also be enlargement of the lymphatic glands, especially late in the disease, but they are not usually enlarged. There are other cases in which the spleen is not greatly enlarged, but the lymphatic glands and bone-marrow are affected; these have been termed cases of **lymphatic leukæmia.** As there are few, if any, therapeutic indications to be derived from a consideration of the pathology, so far as it is known, and the symptoms of this disease, we shall briefly describe only the more salient points in its course and features. Of

its etiology we may be said to know nothing. It has been suggested that it may be caused by a micro-parasite, but this is purely hypothetical. It would seem, in a certain proportion of cases, to bear some relation to previous, though often long distant, attacks of ague; but in by far the great majority of cases no such antecedent has been discovered. It is much more common in males than in females, and it is of most frequent occurrence between 30 and 50 years of age. It is, however, more common in children than was formerly supposed.

It is an interesting and important fact that this disease is one which affects the lower animals, as the ox, sheep, pig, dog, cat, and others.

The enlargement of the spleen may be very great, and may reach from 2 to 18 lbs. in weight.

In *lymphatic leukæmia* the cervical, axillary, mesenteric, inguinal, and other lymphatic glands may be enlarged. The liver is also frequently enlarged, and has been recorded to have attained, in one case, a weight of more than 13 lbs! * Remarkable changes have been observed in the bone-marrow.

The **symptoms** of this disease come on insidiously; progressive abdominal enlargement from splenic hypertrophy, or enlargement of superficial lymphatic glands, is first noticed, accompanied with pallor, dyspnœa, palpitation, and other signs of anæmia. There is a great tendency to hæmorrhage from internal organs, and especially to epistaxis, and retinal hæmorrhages are also common. Gastro-intestinal symptoms, nausea, vomiting, and grave diarrhœa are frequent. As in pernicious anæmia, an irregular pyrexia is often observed, and the temperature may rise at night from time to time as high as 103°, or even higher. Various other symptoms may appear, dependent on the defective nutrition of organs, from the altered state of the blood, or from pressure of the splenic tumour. Recovery is rare, and the

* Allbutt's "System of Medicine," vol. v., p. 643.

greater number of cases end fatally in from one to three years.

An *acute* form has also been described in which a fatal result may follow as early as four or five weeks after the first symptoms have been noticed. The disease presents the same characters as in the chronic form, only intensified in degree.

The diagnosis of this affection must be based on a microscopical examination of the blood; various changes from the normal have been noted in the colourless elements of the blood, but the main point is that the colourless corpuscles are greatly increased in number and the number of red corpuscles much diminished. The average number of white corpuscles per cubic millimetre in health is estimated at about 6,000, or about 1 of white to from 500 to 1,000 red; but in this disease the proportion of white to red may be as high as 1 to 10, or 1 to 5, or they may even exceed the red in number! The hæmoglobin is also diminished in amount, usually in the same proportion as the number of red corpuscles.

With regard to the **treatment** of this disease: it has been stated that cases in young children, in whom there has been a great increase in the white corpuscles of the blood, together with splenic enlargement, have recovered during the administration of quinine in large doses (20, 10, and 6 grains daily to a boy of ten), or other tonics, such as cod-liver oil, syrup of the iodide of iron, and phosphorus. In purely malarial cases quinine is likely to be of value; but the best results seem to have been derived in this disease, as in pernicious anæmia, from the use of arsenic. Large doses have been given, as much as 20 minims of Fowler's solution three or four times a day, and a great reduction in the proportion of white corpuscles has been registered under this treatment. But it is best to begin with ordinary doses and increase them gradually. Osler states that he has repeatedly seen improvement under its use, but, at the same time, points out that there are "curious

remissions in this disease which render therapeutical deductions very fallacious." He has seen marked improvement without special treatment in a patient who, "from a bed-ridden, wretched condition, recovered strength enough to enable him to attend to light duties." **Sodium Cacodylate,** a non-irritating form of arsenic, which can be given in much larger doses than the ordinary official preparations, has been given in this disease both hypodermically and by the rectum, and very good results have been reported, in some instances. For hypodermic injection a sterile, standardised solution can be obtained in capsules, the daily dose being $\frac{3}{4}$ grain or 1 cc. of the solution. For rectal injection the same dose is given, but more diluted—*i.e.* with about 4 drams of boiled water. Phosphorus also has been given in doses of $\frac{1}{30}$ grain in pills, thrice daily, some have thought with benefit.

There is no scientific or rational basis for the administration of *bone-marrow* in this disease. It has, however, been given, and good results have been reported.

Da Costa and others have advocated the use of oxygen inhalations. The former has given 100 gallons daily with benefit. Sticker of Cologne has also reported a marked decrease in the actual and relative number of white corpuscles under the influence of oxygen inhalations, together with a large absolute increase in the red ones. The improvement was not, however, maintained, the spleen continued to increase in size, and the patients succumbed to the disease a few months later. It would have been remarkable if, in the present "surgical age," excision of the leukæmic spleen had not been proposed as a remedy for this disease. This operation has been performed forty-five times with three recoveries! *

The splenic enlargement has been said to have been reduced by means of cold douches to the left hypochondrium, or by passing a galvanic or faradic

* Osler, "Practice of Medicine" (fourth edition), p. 809.

current through the hypertrophied organ, the positive pole being placed over the tenth rib and the negative over the enlarged spleen.

In all these cases it is needful to protect the patient from the influence of unfavourable surroundings. He should, when possible, live in an airy, healthy locality by the sea coast, or in the open country in a dry situation; he should have a carefully adapted, nutritious, and well-prepared diet; he should be made as free from mental worries as possible; and he should be protected from all exposure to cold and from the danger of sudden chill. Physical rest with pleasant surroundings is preferable to attempts at active exercise, which tend to rapidly exhaust and enfeeble such patients. As in most incurable maladies, many other remedial agents have been tried, but none, beyond those that have been mentioned, with any notable benefit.

HODGKIN'S DISEASE, PSEUDO-LEUKÆMIA, OR LYMPHADENOMA.

This disease, which is supposed to have some pathological affinity with the preceding, is characterised by a progressive enlargement of the lymphatic glands, together with symptoms of anæmia. Secondary growths of lymphoid tissue have also been found in the liver, spleen, and other organs. The spleen has been found enlarged in three-fourths of the cases, but not to anything like the same extent as in leukæmia. The causation of this affection is as obscure as that of the preceding. It is more prevalent in males than in females, and in young than in old persons. In some cases the glandular enlargements have been thought to be traceable to local irritation (*Trousseau*). Murray * thinks "the changes we find in the adenoid tissues and lymphatic glands are most easily explained by assuming that they are the result of the action of some pathogenetic parasite," and this view he considers receives support from

* Allbutt's "System of Medicine," vol. iv., p. 587.

the fact that this disease appears in cattle, dogs, horses, and other animals. Organisms have been found in the enlarged glands by some observers, but no definite conclusions on this head are at present warranted.

The first *symptoms* noticed are, usually, enlargement of the glands of the neck, axilla, or groin; these are at first distinct and movable, but they tend to fuse together, and may come to form tumours of considerable size. When the deeper-seated glands become affected, as, for instance, the bronchial and mediastinal glands, serious pressure signs may develop, the chief of which are pains in the chest and dyspnœa; and the symptoms resulting from pressure of the immensely enlarged glands in other situations are often amongst the most serious manifestations of this disease. Progressive anæmia accompanies the glandular enlargements. There is apt to be great variation in the rate of growth and size of the glands. The red blood corpuscles are diminished, and in certain cases the number of leucocytes is greatly increased, bringing this affection into close relationship with splenic leukæmia. As in the latter disease, there is a tendency to hæmorrhage, and especially to epistaxis, and the temperature of the body, too, often rises to from 100° to 103° or higher. Curious ague-like paroxysms have been observed in some cases. When cases do not terminate by pressure of the enlarged glands on important structures, the course of the disease is somewhat variable, but with a decided tendency to a fatal termination. Some cases run a rapid course, group after group of glands being successively involved, and death may occur in two or three months; or periods of quiescence may alternate with periods of activity, and chronic cases may last three or four years. As the fatal event approaches, which is usually from exhaustion, after the development of a cachectic state with progressive anæmia, the glands have, in some instances, been observed to diminish in size and even disappear.

Treatment in cases of this, as in the preceding affection, has not been attended with any great amount of permanent success, and in this disease, as in the other, the strongest testimony is in favour of arsenic.

Two indications are obvious. First, to prevent, if possible, the spread of the disease by attacking the structures first affected; and, secondly, to strengthen the resisting power of the patient.

When the glands are small and localised, removal has been advocated so as to check the spread of infection from them. But this is only to be recommended when the enlargement is confined to a single group of glands, when the spleen is not enlarged, when fever is absent, and the anæmia is not advanced. In a few instances on record such operative interference seems to have checked for some years, at any rate, the advance of the disease. Operation may also be thought necessary if an enlarged gland should compress the trachea or some important nerve or vessel. Other local measures have been tried, such as injection into the substance of the glands of carbolic acid, iodine, arsenic, and other drugs, the applications of galvano-puncture, massage, hot and cold douching, blisters, iodine externally; but all to little purpose. Treatment at Kreuznach or Woodhall Spa has been thought serviceable in some cases.

But of all remedies the internal use of *arsenic* seems to be the only one in which any confidence can be placed. At the commencement ordinary doses may be given—viz. 3 to 5 minims of Fowler's solution, and this may be increased gradually up to 20 minims three times a day, in the absence of toxic symptoms; should such arise, the drug must be discontinued for a few days. It is best given immediately after food, in milk or milk and water.

Its remedial action may be germicidal, or it may antagonise some chemical poison. Phosphorus has also been given, and a reduction in the size of the glands has been noted during its use. General tonics

such as quinine and the phosphates and iodides of iron, may be given, but more particularly good air and good and supporting food should be carefully provided.

It would have been remarkable if, in the somewhat irrational tendency prevailing at the present time, the employment of animal extracts had not been recommended in these cases. Thymus extract, splenic extract, and bone-marrow have all been tried, but we are not aware that any decisively good results have been obtained.

ADDISON'S DISEASE.

This is another disease which affords very little scope for therapeutic efforts, as it usually terminates fatally in spite of all remedies that may be applied.

It is usually associated with tuberculous or wasting disease of the supra-renal bodies, or with morbid changes in the abdominal sympathetic nerves and ganglia. We have no definite knowledge of its causation or its pathology, but some cases appear to have followed blows upon the back or abdomen, and others to have been preceded by caries of the spine. Much discussion has arisen, and much laborious investigation has been carried out, with the view of throwing light on the manner in which the changes in the supra-renal bodies produce the symptoms of this disease, and the prevailing opinion is that they are due to an inadequate supply of supra-renal secretion. The disease is characterised by great asthenia, especially affecting the circulatory organs, by gastric irritability, and by a peculiar pigmentation of the skin and some of the mucous membranes, as those of the mouth, conjunctiva, and vagina. Symptoms which may require treatment are nausea, vomiting, diarrhœa, and great cardiac and general feebleness and tendency to syncope. The disease usually ends fatally, and sometimes runs a rapid course, terminating in a few weeks. Occasionally it is prolonged for years, and in rare instances recovery appears to have

taken place; at any rate, long periods of improvement have been observed. The *indications* for **treatment** are chiefly symptomatic; for the gastric irritability, lime water, creasote, oxalate of cerium, hydrocyanic acid, iced champagne, may in turns be required; and for the diarrhœa bismuth and catechu may be prescribed. Iron has been given in full doses with apparently good effect in some cases, and arsenic and strychnine have proved valuable at times. The internal and external use of iodine was suggested by Fagge, but we are not aware that it has been found to be attended with any remedial effects. Alcoholic and other stimulants, such as ammonia and ether, may be needed to ward off attacks of syncope when they threaten.

The patient's strength must be considered by every possible means. All worry and excitement must be avoided, and when the asthenia becomes extreme rest in bed must be enforced. The tendency to death from syncope must be borne in mind and provided against.

Acting on the hypothesis that the symptoms in this disease are due to supra-renal inadequacy, attempts have been made to relieve them by giving *supra-renal gland substance and extract.*

The supra-renal bodies of the sheep have been given, 2 drams daily, with benefit. Tablets containing 5 grains of the extract have also been employed. Different extracts seem to act differently according to various observers—one raising the blood pressure, and another having an opposite effect. It is generally believed that the medulla alone contains the active physiological principle, and that the cortex is inert. Improvement seems to have been obtained in many cases, but on the whole results have been disappointing; further observation is, however, desirable.

Good air, and light but nutritious food, are great aids in supporting the patient. Some patients are said to do best on an exclusive milk diet.

EXOPHTHALMIC GOITRE, GRAVES'S DISEASE, BASEDOW'S DISEASE.

It will be convenient to consider in this chapter the treatment of this remarkable affection, which, although often dealt with under diseases of the thyroid gland, is especially marked by circulatory and nervous disturbances.

The three well-known and characteristic signs of this disease are exophthalmos, or prominence of the eyeballs; enlargement of the thyroid; and functional excitement of the heart, or palpitation. Its mode of origin is obscure, but it is much more frequent in women than in men, and is most apt to occur between 20 and 30 years of age. Depressing emotions, worry, fright, or nervous shock of some kind have frequently been noticed to precede the onset of this disease, and heredity would appear to have an influence in some cases.

The onset of the *symptoms* is usually gradual, and the disease generally runs a chronic course; but Osler refers to two rapidly fatal cases occurring in the Philadelphia hospital—one with marked cerebral symptoms, and another in which death occurred from vomiting and diarrhœa, on the third day of the illness. Palpitation is usually the first symptom complained of, with shortness of breath, and the heart's impulse is felt to be greatly increased in force, and all the visible arteries are observed to throb and beat strongly. The heart-beat may vary from 100 to 160, or even more, and it is readily excited by any emotional disturbance. Soft systolic murmurs at the base of the heart are common. The prominence of the eyeballs is early noticeable; at first slight, it may become so considerable that the eyelids cannot close completely, and it has been known to reach such a degree that the eyeball has been dislocated from the orbit. What is known as Von Graefe's sign is that when the eyeball is moved downwards the upper lid does not follow it. There

is also sometimes spasm or retraction of the upper lid. The enlargement of the thyroid may be general, or it may be limited to one lobe; its vessels are much dilated, and the whole gland is found to pulsate with a thrill. The patients are usually, at the same time, anæmic, emaciated, febrile, and highly nervous. There is often marked muscular tremor. They complain of painful flushing and distressing perspiration. Pigmentary changes in the skin are often observed. Gastro-intestinal irritation, with vomiting and diarrhœa, is not infrequent, and in grave cases the latter symptom may prove very intractable. Great irritability of temper and mental depression usually manifest themselves.

Recovery is not uncommon in the milder cases, and is sometimes rapid, but many of the severer forms prove intractable. Relapses are also common. It has been noted that myxœdema sometimes follows closely on exophthalmic goitre.

This disease has been regarded as connected with some nervous lesion; the cervical sympathetic has been pointed to as the seat of injury, and coarse anatomical changes have been described in the lower cervical ganglion. Others refer to the medulla and upper cervical portions of the cord as the more probable seat of the lesion, and we have ourselves given reasons for supposing the emotional centres may be directly or indirectly involved;* recently the suggestion has been advanced that it is due to over-activity and hypersection of the thyroid itself. But there are great difficulties in the way of accepting this view, indeed the pathogeny of exophthalmic goitre is far from settled; it is highly probable that there is a combination of factors varying in degree in different cases, and which combine to produce the phenomena of this disease.

We may consider the **treatment** of this affection under three headings—1. Hygienic, including change

* A Case of Exophthalmic Goitre with New Phenomena (*Brit. Med. Journ.*, March 17th, 1877).

of air, hydrotherapy, and suitable food. 2. Local, and especially electrical treatment. 3. Medicinal, including the treatment of symptoms.

1. Change of air and scene, with restful and invigorating surroundings, is of the very greatest importance in the treatment of these cases. In spite of statements to the contrary, we desire to state emphatically that we know of no such remedial influences, in remediable cases of this affection, as a prolonged residence at a suitable seaside resort or a well-selected mountain resort of moderate elevation. We should not recommend patients with this disease to seek, as a rule, an exciting climate like that of the Western Riviera, nor should we recommend them to incur the risks of the frequently chilling air of such elevations as Davos or the Engadine; but in such seaside resorts as Brighton, Westgate, Folkestone, or Biarritz, which present a combination of the sedative and tonic effects of sea-air, or at such moderate elevations as Glion, Sonnenberg, Aussee, or even Engelberg and St. Beatenburg, some of the very best results have been obtained; we refer, of course, to the summer season in the mountains. We are supported in our view of the good effect of mountain air by so great an authority as Nothnagel, who considers a "sojourn in mountain regions most important,"* and also by Stiller, of Budapest,† who has recorded two instances of the successful treatment of Graves's disease, with pronounced cardiac failure, by residence at an elevation of 1,000 metres (3,250 feet), about the elevation of Engelberg. Eulenberg also has advocated high altitude sanatoria, but he prefers sub-Alpine ones when dyspnœic symptoms are prominent. Much misapprehension exists as to the effects of such moderate elevations as these on the circulatory organs; in the first place, the sedative effect on nervous states which such resorts commonly produce reacts most favourably on the circulatory organs, and the purity and tonic

* *Medical Press*, December 25th, 1889, p. 655.
† *Centralblatt für klin. Med.*, 1888, No. 34, p. 617.

quality of the air have a general strengthening and restorative effect. In a good season sitting out of doors for many hours of the day is possible, and the moral effect of cheerful surroundings and pleasing scenery is not to be overlooked. Whenever, then, the patient is able to bear the fatigue (and the expense) of removal, either to a suitable sea-coast or mountain resort, this should be the first consideration, and we can assert that it is capable of effecting a cure in many cases without any other treatment.

A modified course of **hydrotherapy** in a good bracing locality has also much to recommend it, and has been found of decided benefit in certain cases. Nothnagel recommends tepid half-baths, irrigations, packing, and the cold spinal bag. Jaccoud advises tepid or warm douches daily for 25 or 30 seconds. After a time their temperature may be reduced until at last they may be given quite cold; but he very properly warns against beginning with *cold* douches, as in these nervous patients they often aggravate the cardiac excitement.

The **diet** should be of a nutritious but bland and unstimulating character. Alcoholic drinks, and tea, coffee, and tobacco should be avoided. Great reliance is placed by some physicians on a milk diet; when the heart is weak some additions may be made to this in the form of pounded meat, or fish, or chicken, or clear soup, and a little red wine, in some cases. Whenever disorders of the digestive organs are present, such as gastric catarrh, or diarrhœa, great attention must be paid to the diet, which should consist chiefly of milk and bland farinaceous foods, such as tapioca, sago, arrowroot, and the like. Pancreatic emulsion has been found beneficial in many cases.

Much repose in the recumbent position is advisable, but, except in extreme cases, the patient need not be confined to bed, especially if such confinement is felt to be irksome and annoying. All cause of excitement, mental and physical, should be carefully

avoided, and everything that is possible should be done to promote a cheerful and hopeful frame of mind.

2. In the next place we must consider the value of local, and especially of **electrical,** treatment.

The application of cold to the præcordial region, or over the lower part of the neck, has been found useful by many in quieting the palpitations Nothnagel uses an ice-bag, and Osler recommends either this or Leiter's tubes. These applications, however, are not unattended with danger, if incautiously employed, and they occasionally cause inflammation and sloughing of the distended skin over the thyroid.

We would urge that it is necessary, in making such applications, to have particular regard to the hyper-sensitive state of these patients, and to consult their feelings, and to watch carefully the effect on the circulation.

A Martin's bandage has been applied round the throat by day and removed by night, to restrain the pulsations of the thyroid; and a compress and bandage have been found useful, applied over the projecting eyeballs during sleep.

Testimony as to the efficiency of local electrical treatment is almost universal. Fagge is almost alone in stating that galvanic treatment has been followed with little advantage. We have ourselves observed it cause great aggravation of all the symptoms in the case of a highly nervous and sensitive patient, but we thought that the electrical specialist in this instance applied far too strong a current.

We also note that in all the cases reputed to have been benefited by this method of treatment, it has been applied regularly for *six months;* now we have observed very remarkable improvement from change of air alone in this period, and the value of this treatment, upon which we do not desire to throw any doubt, must rest on the benefit it confers on patients who cannot, at the same time, avail themselves of suitable change.

Nothnagel advises galvanism through the medulla and the cervical sympathetic. Charcot recommended the faradic current to be applied to the eyelids, the thyroid, and the cardiac region. Osler admits that many cases have derived temporary improvement from the use of the galvanic current, the cathode being placed at the back of the neck, and the anode along the course of the sympathetic or over the heart. Jaccoud considers the best form of electricity to employ is bilateral galvanism of the neck, daily, by means of weak continuous ascending currents.

3. We now come to the question of **medicinal** treatment, and here we encounter, as might be expected, great diversity of opinion. We agree with Nothnagel in believing that medicines "are of little use" as direct curative agents, but we believe that as auxiliaries and for the relief of symptomatic conditions suitable medicines will be found of very great value. Fagge asserts that iron seldom or never does good, and that digitalis has no power in tranquillising the heart. Osler, on the other hand, advises a combination of digitalis and iron when there is marked anæmia, and Nothnagel commends a combination of iron and bromides. We have frequently given iron in combination with sodium bromide with very great advantage in the milder forms of this disease associated with anæmia in young women. We always use a mild preparation of iron, generally the ammonio-citrate, and we give 5 to 10 grains of this thrice daily with 10 grains of sodium bromide, with the effect of benefiting the anæmia, quieting the nervous excitement, and lessening palpitation. Digitalis we have found a "two-edged sword"—in some cases it will quiet the action of the heart and reduce the pulse rate, but in others it seems to increase the cardiac excitement and to make matters worse; and its tendency to cause gastric irritation is more manifest in this disease than in any other. On the whole, we think it should not be commonly prescribed in this disease. Several trustworthy observers testify that

strophanthus, 5 minims of the tincture three times a day, quiets the cardiac action and is of real service in this malady. *Cactus grandiflorus*, the fluid extract and the tincture, the former in doses of 5 minims, and the latter in doses of 10 to 45 minims, three times a day, has also been found of marked value in some cases. Friedreich advises the continued use of quinine; we agree with Jaccoud that it often fails to agree with these patients. Arsenious acid is a favourite remedy of Jaccoud; he gives $\frac{1}{32}$ grain, twice a day, with the food, and increases the dose, with intermissions, up to $\frac{1}{16}$ grain. Cacodylate of sodium has been found useful in many cases, and is a preparation which permits of the use of arsenic in larger doses. Besides the bromides, which are very useful in allaying the troublesome nervous symptoms and insomnia, we have also found valerianate of zinc, a grain three times a day, valuable for the same purpose. The bromide and iodide of strontium mixed have been given with much improvement in certain of the symptoms.

Belladonna has a certain amount of testimony in its favour, and made into a collodion it has been painted over the thyroid enlargement. We do not advise the use of such depressors of cardiac force as aconite and veratrum viride, recommended by some authorities; the cardiac force does not need depression, but regulation.

The use of sodium phosphate—from $\frac{1}{2}$ a dram to 2 drams daily—has had many advocates. It is quite harmless, and should therefore merit a trial. Dr. Meltzer combines the use of thymus gland with this salt.* He gives the thymus minced raw in wafers.

The gastro-intestinal troubles may require the exhibition of bismuth, hydrocyanic acid, and alkalies; the diarrhœa in the later stages of this disease often becomes most intractable, and may require the use

* Hare's "System of Practical Therapeutics" (new edition), vol i., p. 617.

of opiate enemata—10 grains of Dover's powder and 20 grains of tannin mixed with 2 ounces of starch may be thrown into the bowel twice a day if necessary. We have found the tincture of coto, in 10 to 20 minim doses, mixed with a dram of compound tincture of cardamoms, a dram of mucilage, and an ounce of chloroform water, one of the best internal remedies for this symptom. The use of the aromatic sulphuric acid, in 20-minim doses, three times a day, has been found to give very good results.

Dr. Minor,* of Ashville, N.C., has reported a successful treatment of two cases on the idea that this disease arises from "intestinal auto-intoxication." The drugs given included salol, beta-naphthol, resorcin, guaiacol carbonate, and an occasional dose of calomel, and also free intestinal irrigation with hot water. Dr. M. P. Jacobi has also published a successful case treated on the same lines.

Thyroidectomy, ligature and division of the isthmus and partial removal of the gland, has repeatedly been performed with the object of relieving the dyspnœa caused by pressure on the trachea, but the operation is a serious and dangerous one, and although good results have been claimed for it, in some instances, it has never been generally regarded with favour in cases of true Graves' disease. The risk of fatal hæmorrhage is always present. Recently surgical measures have again been advocated and practised in Germany and elsewhere. In several cases resection of the thyroid has been successfully carried out and enucleation in others. It has been stated that all, or almost all, the clinical symptoms have been relieved by these operations; but more evidence is still needed in order to justify surgical interference. Section of the *cervical sympathetic* has been done in a certain number of cases, and benefit is said to have followed. Attempts have also been made to treat this disease with **thyroid** and **thymus extracts.**

* *Lancet*, vol. i., 1900, p. 116.

Ord and Mackenzie* state that they have not observed any cases in which the patient was decidedly benefited by this treatment, while, in some instances, the patient's symptoms were distinctly aggravated even by small doses of thyroid extract.

In extremely violent attacks of palpitation, jeopardising life, which have been reported, but which we have not witnessed, various expedients have been suggested, such as venesection, the free use of ether and other stimulants, the ice-bag to the heart, inhalations of nitrite of amyl, and hypodermic administration of morphine and atropine.

MYXŒDEMA.

This singular disease, to which much attention has of late years been directed, mainly through the observations of Gull and Ord, seems to be dependent on a morbid condition of the thyroid body, and to be pathologically related to those cases of sporadic cretinism in which there is a congenital absence of that gland.

The disease to which we are now referring was described by Sir William Gull as "a cretinoid state supervening in adult life in women." Ord and many other observers have investigated and fully described this affection, and have shown that it is not restricted to women, although they are far more frequently affected with it than men.

The mode of origin of the disease is obscure, but it has been referred to mental anxiety and distress. The anatomical condition appears to be wasting or degeneration of the thyroid gland. It may be much diminished in size, or it may be completely atrophied and converted into a fibroid mass. The presence of an enlarged thyroid is not, however, inconsistent with the manifestations of this disease, as, although enlarged in size, the gland may, functionally, have undergone degenerative changes. The chief symptoms and clinical features of this disease are the following:—

* Allbutt's "System of Medicine," vol. iv., p. 507.

Great loss of muscular energy, so that the patient's movements become remarkably feeble and slow, and his gait unsteady and "swaggering"; his speech also becomes slow and deliberate, and sometimes indistinct, and the tongue is thick and swollen; mental operations, too, are slow and flagging. The face has a peculiar and characteristic appearance. It is swollen and expressionless; the complexion has a waxy aspect, and there is a bright red spot on each cheek caused by dilatation of veins and capillaries; the alæ of the nose are thickened and the nose itself is flattened and spread out; the lips are thickened, swollen, and often cyanosed; the eyelids are also swollen, baggy, or puffy, and transparent, but on puncture no fluid exudes; the eyelashes and eyebrows often disappear, and the hair disappears also from the axillæ and pubes and in part from the head, so that the patient may be nearly bald. The body generally increases in size and weight, and the abdomen becomes protuberant. The hands are notably swollen, clumsy, and "spade-like," their backs are especially so, the fingers are thick and sensation is defective. The "œdema" is *solid*, and does not pit on pressure. There is further a peculiar swelling of the subcutaneous tissues in the supraclavicular regions. The skin is observed to be very dry and rough, and the patient rarely or never perspires. The circulation is languid, the pulse slow and feeble, and the heart sounds weak. The temperature is usually sub-normal. Albuminuria is sometimes present.

The clinical study of this disease, and especially the successful efforts that have lately been made in several quarters to deal with it therapeutically, have thrown much light on the functions of the thyroid body, and have raised, if we may use the expression, the physiological rank of that organ. It is clear, from the results observed to follow disease of this gland, as well as from its removal in men and animals, as reported especially by Kocher of Berne and Horsley in England, that it elaborates, normally, some secretion

which passes into the general circulation and exerts there an important influence in tissue metabolism.

We will now briefly consider the therapeutic measures that have been applied to the amelioration and cure of the myxœdematous state. At first the application of hot baths and keeping the body warm and well protected from chill, and promoting the action of the skin by the exhibition of jaborandi, was all that seemed clearly indicated, and some improvement in the symptoms and general condition had been observed by Ord and others as the result of this treatment. But most remarkable results have been obtained by the adoption of a method of treatment which inaugurated a new departure in therapeutics, and which has been followed by many innovations in the same direction that have been attended with a variable degree of success. Remedial agencies, in the shape of drugs, had hitherto been looked for chiefly in the mineral and vegetable kingdoms; we have extracted the juices of many *vegetable* organisms, and applied them to the relief of human suffering and infirmity. We have now turned to the *animal* organism to seek curative and preventive powers for certain morbid states in the juices of animal tissues and organs. The observation of the frequent occurrence of a peculiar morbid state (*cachexia strumipriva*), closely allied to cretinism and myxœdema, in persons and animals (monkeys) whose thyroid glands had been wholly or partially removed, and the knowledge of the fact that in cases of congenital or sporadic cretinism the thyroid gland is congenitally absent; and further, the discovery that in cases of myxœdema the thyroid body is often found shrivelled and completely atrophied, led up to this remarkable therapeutic discovery.

The first attempts were made with **thyroid grafting.** This had been carried out with good results in *cachexia strumipriva*, in *sporadic cretinism* and in *myxœdema*, by Kocher, Horsley, Bircher, and by Gibson, of Brisbane. In a case of sporadic

cretinism fully reported by Gibson,* the grafting was done by removing both lobes of an ætherised lamb's thyroid, incising them longitudinally and introducing them (1) within the sheath of the pectoral muscle, and (2) on another occasion into the child's abdomen. The improvement in the child's condition which followed was most remarkable. Murray, of Newcastle, was one of the first to suggest and adopt the use of an **extract** of the **thyroid glands** of sheep, injected hypodermically, in the treatment of these conditions, and remarkable results were obtained.†

It must be borne in mind that the too rapid introduction of the thyroid extract into the blood, or its introduction in too large quantity at a time, is unsafe, and is apt to be attended by unpleasant phenomena, such as flushing, nausea, lumbar pains; and even loss of consciousness and tonic muscular spasms have been induced. There is also another important caution to be kept in view, and that is that such patients must not be allowed to return too soon to their former mode of life, after their apparent cure, for in some the cardiac muscle remains very feeble, and sudden death from cardiac failure has been noted in some patients on making efforts to which they have long been unaccustomed. Of course this kind of treatment, which has for its object to supply the defective thyroid secretion, must in most cases be more or less continuous, and on its entire discontinuance relapses must be expected. But the hypodermic method of administering the fluid extract is now largely supplanted by the use of dry extracts, and especially of that made in the tabloid form.

It is best to commence the treatment with small doses. One of Burroughs and Wellcome's smaller tabloids (grain $1\frac{1}{2}$) may be given once or twice a day. This dose should be gradually increased up to 6 grains daily. Then after a few days' interval a

* *Brit. Med. Journ.*, Jan. 14th, 1893. † *Ibid.*, Aug. 27th, 1892.

slowly progressing increase may be again adopted, provided no untoward symptoms are manifested. Three doses of 5 grains each per diem should be regarded as the maximum. The occurrence of headache or pains in the muscles should at once be regarded as signals for diminishing the dose, and should more serious toxic symptoms appear the drug must be discontinued for eight or ten days, and the patient carefully watched. The treatment may then be resumed with quite small doses. It has been found that patients bear this treatment better when kept mainly on a suitable vegetable diet. A small dose of strychnine ($\frac{1}{30}$ to $\frac{1}{20}$ grain) three times a day is helpful in supporting the patient's strength during this treatment. After the full effect of the thyroid treatment has been obtained, the question arises as to the best method of continuing its use so as to avoid relapses. The best results seem to have been obtained by giving 10 or 12 grains three or four times a week for three or four weeks. Then the drug is for a time discontinued until some signs of a relapse appear, when small doses (3 grains thrice daily) for a week will generally suffice for their removal; then return to the thrice weekly dose, and so on.

Iodothyrine, a substance separated from the thyroid gland, containing nearly 10 per cent. of iodine, mixed with sugar of milk, so that 15 grains of the powder is equal to about 15 grains of fresh gland, has been introduced for the treatment of myxœdema and other affections. Meltzer has found it serviceable in this disease.* He did not find it so active as the other preparations of the gland, but it had the advantage of being tolerated in large doses—30 grains a day for many weeks—without giving rise to any unpleasant symptoms. It is certain that iodothyrine represents only a part of the active substance of thyroid, but Meltzer considers there is

* Hare's "System of Practical Therapeutics" (new edition), vol. i., p. 602.

some advantage in this—for, as it does not contain albuminous matter, it must be free from toxic ptomaines, and does not decompose even after months—hence probably the reason why, unlike other preparations of the gland, it so rarely causes disagreeable symptoms.

The fresh thyroid glands themselves have been given by the mouth in many cases, and thus taken they appear to be quite efficacious. Half a sheep's thyroid seems to be a suitable dose for an adult. It must be eaten raw, and may be minced fine and mixed with a little weak spirit and water, or wine and water, or syrup. Besides the tabloids of Messrs. Burroughs and Wellcome, each 5-grain tabloid being equivalent to $\frac{1}{12}$th of a lobe of the fresh thyroid gland of the sheep, there are many other preparations in use. The tabloid form, however, seems the most convenient, and affords the greatest facility for regulating the dose.

The results of this mode of treatment in myxœdema may be thus summarised: the swelling diminishes and the natural expression of the face returns, the skin peels off and the cutaneous surface loses its harshness and dryness, and becomes soft and moist, and the patient is able again to perspire freely. New hair grows on the head. After a brief period of feverishness the previous sub-normal temperatures approach the normal. The hands and the rest of the body become smaller, and there is usually a great loss of weight. Mental as well as bodily activity is to a great extent restored. Increased diuresis is common.

In cases of sporadic cretinism the commencement of the treatment has been frequently marked by some febrile disturbance with mental excitement and restlessness; after a little time the œdematous infiltration of the tissues begins to subside rapidly, and in a few weeks disappears. The skin, as in myxœdema, peels and becomes soft and smooth, and the hair grows over bald areas. The child becomes more lively and

intelligent, and there is a most remarkable growth of the skeleton (in one of Byrom Bramwell's cases the child grew 6½ inches in six months !).

ADDITIONAL FORMULÆ.

For exophthalmic goitre.

℞ Ferri carbonatis saccharatæ, gr. xx
Quininæ sulphatis, gr. xxx.
Extracti et pulveris glycyrrhizæ, q.s.
Ut f. pil. xxx. Three to be taken daily after meals.
(*Benedikt.*)

For the same.

℞ Pulveris ipecacuanhæ, gr. ss.
Pulveris foliorum digitalis, gr. ⅓.
Extracti opii, gr. ⅛.
M. f. pil. Four to six to be taken daily. (*Dieulafoy.*)

For exophthalmic goitre.

℞ Tincturæ ferri acetatis ætheris, ʒj ad ʒij.
Potassii iodidi, ʒij.
Aquæ ad ℥vj.
M. f. mist. A teaspoonful three times a day; also frictions with iodine ointment.
(*Lentovsky.*)

Iron and bromide mixture for the same.

℞ Ferri et ammoniæ citratis, gr. xl.
Sodii bromidi, gr. lxxx.
Spiritus ammoniæ aromatici, ʒij.
Aquæ ad ℥viij.
M. f. mist. Two tablespoonfuls twice a day.

Part III.

DISEASES OF THE ORGANS OF RESPIRATION.

CHAPTER I.

THE TREATMENT OF CATARRHAL AFFECTIONS OF THE RESPIRATORY ORGANS: ACUTE AND CHRONIC NASAL AND LARYNGEAL CATARRHS.

ACUTE NASAL CATARRH or CORYZA.—Causes: Predisposition—Chill—Dust—Symptoms—Treatment: (*a*) Prophylactic—(*b*) General—Preparations of Opium and Morphine—Quinine—Salicine—Aconite—Belladonna—Camphor—The "Dry" Cure—(*c*) Local—Inhalations—Sprays—Insufflations—Supra-renal Gland Extract. CHRONIC NASAL CATARRH.—Astringent Snuffs and Injections—Alkaline Injections—*Ozæna* or *Atrophic Rhinitis*—Obscurity of its Nature and Cause. Treatment: Indications—Cleansing Douches—Formulæ—Antiseptic and Deodorising Paints—Sprays—Injections—Bougies and Insufflations—Formulæ. ACUTE LARYNGEAL CATARRH.—Causes resemble those of Acute Nasal Catarrh—Symptoms—Treatment: Codeia or Morphine—Alkaline Drinks or Mixtures—Counter-irritation—Cold Compresses—Cocaine—Inhalations—Severe Dyspnœic Form in Children—Leeches—Emetics—Scarification—Tracheotomy—Sedatives and Expectorants. CHRONIC LARYNGEAL CATARRH.—Causes—Symptoms—Treatment: Mineral Waters—Local Applications—Inhalations—Insufflations—Sprays—Massage—Climate. Additional Formulæ.

ACUTE NASAL CATARRH OR CORYZA.

THE phenomena attending an attack of acute nasal catarrh, coryza, or "cold in the head," are so familiar as to scarcely need description. The disease is interesting and instructive, however, as a type of catarrhal affections generally, since the inflamed mucous membrane is, in this case, accessible to view.

The **causes** of acute nasal catarrh are the same as those of other catarrhal affections of the air-passages, viz. exposure to some local irritant, or to

chill of the surface of the body, or to rapid changes of temperature; but exposure to these exciting causes does not necessarily produce this disease, unless a predisposition "to take cold" exists in the individual. This constitutional predisposition is very marked in many persons, and is not easily accounted for.

Catarrhs of the nasal and other mucous membranes are the result often of *reflex* rather than of *direct* irritation. A current of cold air falling on the head or face, or some other part of the body, will, in predisposed persons, give rise to an attack of acute nasal catarrh.

Dust is another frequent cause, especially the foul dust of the streets blown about by a cold east wind.

In certain instances this disease seems to be infectious, and will sometimes spread from one member through a whole family.

The physical changes which are observable in the nasal mucous membrane when affected by an acute catarrh are these:—The membrane is more or less red and swollen, so much so, sometimes, as to completely block up the nasal passages; the swelling is due to dilatation and congestion of the blood-vessels and exudation into the tissue of the mucous membrane. At first the surface is dry, but soon the fluid exudation is so considerable that it flows away from the surface as a colourless, thin, saltish fluid, often very irritating to the orifices of the nose and the adjacent skin of the lips. Later the swelling and congestion diminish, and the discharge becomes thicker and less transparent from the presence of abundance of young cells.

The **symptoms** accompanying this condition are, first, a sense of dryness and stuffiness in the nose, with a great desire to blow the nose—to "clear it"—sometimes there is a tickling feeling with an irresistible tendency to sneeze; the feeling of dryness is soon succeeded by the flow of fluid just described, which may become distressingly abundant.

There is usually a smarting, painful feeling about the forehead and eyes, due to the extension of the

catarrhal inflammation to the conjunctivæ and the frontal sinuses; sometimes it extends to the fauces, and causes pain in swallowing, or into the larynx, and gives rise to an irritable cough, or along the Eustachian tube, causing some pain and noises in the ears, and slight temporary deafness. With some persons there is usually a certain amount of fever present, with quickened pulse, slight rise of temperature, thirst, high-coloured urine, chilliness, and aching of the limbs. With careful treatment this disease usually disappears in from three to eight days, but if neglected it may terminate in chronic catarrh, which may extend to the larynx, or even to the bronchial tubes.

The **treatment** of acute nasal catarrh may be conveniently considered under three heads:—(*a*) prophylactic, (*b*) general, and (*c*) local.

(*a*) *Prophylactic treatment.*—This should consist in the adoption of some hardening process which shall have for its object the removal or diminution of a certain hyper-sensitiveness of the skin and mucous membranes which characterises such patients.

Avoidance of sedentary habits and free exercise in the open air are of great value. Cold affusion over the head and neck, begun in warm weather and steadily maintained throughout the whole year, is of undoubted efficacy.

One of the best prophylactic measures against attacks of nasal catarrh is residence in a dry, bracing locality.

Removal for a season to the dry, cold, bracing climate of the Engadine, or some similar resort, is of especial value in lessening the morbid sensitiveness of the surface, so far as it tends to the production of catarrh of the respiratory tracts.

Next in value to mountain air is well-directed sea bathing, during the summer months, associated with abundant exposure to the open air of the seaside. Such patients should not be allowed to remain long in the sea at a time; it is better they should make repeated plunges, for it is the bracing shock to the

surface that is required, not the continued contact of the cold sea-water.

(*b*) Of *general* remedies, diaphoretics are undoubtedly most useful, and one of the most effectual of these is **opium.** It acts best when combined with other diaphoretics. If it fails to cure the cold, it at any rate relieves the most distressing symptoms.

Opium undoubtedly exercises a remarkable effect upon the capillary circulation in the respiratory mucous membranes, but it is by no means a matter of indifference what method of administering the opium is adopted.

When the cold is quite in its initial stage, when the nasal mucous membrane is only a little swollen and dry, and there is an uneasy feeling over the frontal sinuses, and before the occurrence of any great amount of fluxion, the following is perhaps the best method :—

Supposing the patient to have had a good meal in the middle of the day, no more solid food should be taken that day, but about three or four hours before bed-time a pill of $\frac{1}{8}$th of a grain of acetate or sulphate of morphine should be taken with a small cup of weak tea; and at bed-time another $\frac{1}{8}$th of a grain with a wine-glassful of whisky and water.

If the patient is feverish or is of rheumatic tendency it is an excellent plan to combine 10 or 15 grains of *salicine* with the dose.

A saline aperient—such as a seidlitz powder in warm water, or a few ounces of Apenta water (warmed), the following morning—is also useful.

This measure alone will constantly arrest a cold in the head if adopted in the initial stage. If it fails, it fails from want of attention to small details. It makes all the difference whether this small dose of morphine be taken when the stomach is full or empty, whether it be absorbed into the blood in a few minutes, or whether it be mixed with a mass of food and absorbed slowly. The result in the two cases is wholly different. In the first case you have a definite

quantity of the remedy immediately absorbed into the blood; in the second, the remedy is slowly absorbed in indefinite quantity, and there is no reason why some of it should not pass out of the body in the residue of the food.

If the dry initial stage is passed, and the nasal fluxion is thoroughly established, with a distressing feeling of oppression and stuffiness about the nasal passages and frontal sinuses, the following diaphoretic draught, containing opium, is of the greatest use :—

℞ Liquoris opii sedativi ♏x.
Vini ipecacuanhæ ♏ijss.
Salicini puri... gr. xv.
Liquoris ammonii acetatis... ʒiij.
Aquæ camphoræ ad ʒjss.
Misce, fiat haustus. To be taken at bed-time.

If the patient is able to remain in the house, or, better still, in a moderately warm room for a day or two, a single dose of this kind will not unfrequently remove all the catarrhal symptoms permanently as well as immediately.

But even these small doses of morphine or opium are not well borne by some persons; the use of these drugs, in some patients, is usually followed by nausea, a furred tongue, dark-coloured urine, pale, clay-coloured stools, and a feeling of general *malaise*. These are persons commonly known as "bilious." The functions of their liver cells are easily inhibited for a time, especially by opium. In such cases it is best to avoid opium altogether, and give other diaphoretics, such as two tablespoonfuls of the following mixture every four or five hours :—

℞ Spiritus ætheris nitrosi ʒiv.
Liquoris ammonii acetatis ʒij.
Salicini puri gr. xl.
Vini ipecacuanhæ ♏xx.
Aquæ camphoræ ad ʒviij.
Misce, fiat mistura.

This is also a useful mixture for young children,

in doses varying from two teaspoonfuls to a tablespoonful.

After the first twenty-four hours, or even sooner, it is often advantageous to give some **quinine**, especially when there is feverishness and a feeling of depression. It is best given in an effervescing saline mixture as follows:—

℞ Potassii bicarbonatis } āā ʒj.
Sodii bicarbonatis }
Ammonii carbonatis ʒss.
Syrupi aurantii ℥ss.
Aquæ ad ℥viij.

Misce, fiat mistura.

℞ Quininæ sulphatis gr. xij.
Pulveris acidi citrici ʒij.
Sacchari lactis ʒj.

Misce et divide in pulveres sex. One of the powders, dissolved in water and mixed with a sixth part of the mixture, to be taken three times a day.

In children and young people, when an attack of coryza is attended, as it often is, with decided feverishness, and particularly if the throat is involved and its mucous membrane is found red and swollen, great benefit will follow the administration of a few doses of **aconite**. Indeed, aconite will be found most valuable in all the ephemeral and symptomatic fevers of children and young people. A convenient form is Schiefflin's pilules of Duquesnil's aconitine, $\frac{1}{480}$ grain in each. One of these should be given every two hours for three doses, or 1 to 5 minims of the tincture of aconite (according to the age of the patient). As a rule, aconite is a drug that produces an *immediately* beneficial effect, or it is of no value; it is therefore of much use in the *initial* stage of febrile maladies, but of little use in the advanced stages. It is a drug, therefore, which should never be given in large doses with a view of obtaining better effects than from small or moderate ones, nor should it be persevered in when it fails to afford immediate relief.

Camphor is a popular remedy for coryza; a few

drops of the spirit of camphor, on sugar, or taken in water, every half hour, will in certain persons arrest a cold in the head, if taken in the initial stage; but it is not to be compared in efficacy with opium or morphia, given in the manner enjoined.

What is called the "dry" cure consists in stopping the supplies of all liquids; and so, by not adding any water to the blood, while the system withdraws from the blood the fluid required for the natural secretions, the quantity of fluid in the blood-vessels is diminished, and the local hyperæmia thereby lessened. The catarrh ceases because the supply of fluid to the blood is cut off. The amount of fluid permitted is a table-spoonful of milk or tea with the morning and evening meals, and a wine-glassful of water at bed-time. But this has never been a popular method—the remedy appearing to many persons worse than the disease!

(*c*) Lastly, we have to consider the action of *remedies applied locally.*

A common and popular method of attempting to cut short an attack of coryza is to inhale the vapours given off by a mixture of ammonia, carbolic acid, and rectified spirit:

℞ Liquoris ammoniæ fortis ʒj.
Spiritus vini rectificati ʒij.
Acidi carbolici ʒj.
Aquæ ʒij.
Misce.

This mixture is dropped upon some absorbent substance, and the vapour is inhaled by the nostrils.

The following is also an excellent inhalation (dry) in the earliest stage of nasal catarrh; it can be inhaled from the bottle in which it is contained:—

℞ Pinol ʒij.
Camphoræ gr. xl.
Liquoris ammoniæ fortis ʒj.
Spiritus rectificati ʒj.
Misce, fiat inhalatio.

The inhalation of the vapour of **menthol** we have found the most useful of all in recent nasal catarrh.

When the secretion is profuse and the nostrils feel blocked up, benefit is often obtained by the application of a warm spray or douche of a weak solution of common salt or sodium bicarbonate (2 to 6 grains to the ounce), or Ems water, four or five times a day.

Brushing the nasal mucous membrane with glycerine has been found useful, and the application of an oily spray often proves very comforting.

Relief to the sense of distressing fulness may often be obtained by applying pledgets of cotton-wool soaked in a 2 to 4 per cent. solution of cocaine, or by inhaling menthol dissolved in chloroform, a few drops at a time from the palm of the hand. The excessive secretion may be checked by injections of hazeline.

The fact that *supra-renal gland extract* acts as a powerful local astringent when applied directly to mucous membranes, causing blanching and shrinking of the inflamed tissues, has led to its *local* application for the relief of coryza, and it is preferred by some to cocaine, which they regard as a dangerous drug. An aqueous solution of the strength of 20 grains of the dried extract to ½ oz. of water has been used. This is applied on pledgets of cotton-wool, the nose and naso-pharynx having been previously cleansed by an alkaline lotion.*

The recurrent form of nasal catarrh will often yield to change of air—from the town to the sea-side or the open country.

CHRONIC NASAL CATARRH. OZÆNA.

Many chronic forms of nasal catarrh are associated with structural changes in the nasal passages, and are only amenable to special surgical treatment, and, therefore, do not concern us here. Other forms are perhaps better termed *recurrent* than *chronic*, and are associated with the tendency to attacks of acute coryza already referred to. These are best treated by change of air, and by tonics, of which, as we have

* Burroughs and Wellcome prepare for external use "Soloids," each containing half-a-grain of supra-renal gland extract.

already said, arsenic, or arsenic with iron, is the best. Injections of hazeline diluted with an equal quantity of water are also useful in these recurrent forms, and so also are injections of acetate of lead (4 to 16 grains to the ounce of distilled water).

Dry inhalations of pinol, eucalyptol, turpentine, menthol, and iodine may all be tried with advantage in different cases. If there is a tendency to the formation of crusts of inspissated mucus in the nostrils, these should first be washed away by douching the nasal passages with warm solutions of sodium bicarbonate and common salt (2 to 5 grains of each to the ounce), and the above astringent injections or inhalations should be applied subsequently.

Oily sprays applied by means of an oil atomiser are very useful. Liquid albolene and parolene may be employed as the basis of such sprays, and 10 minims of terebene to the ounce may be added.

The most troublesome and serious form of chronic nasal catarrh is that known as **ozæna** or atrophic rhinitis, characterised by the peculiarly offensive fœtid odour of the discharge from the nose, and of the expired air.

The anatomical condition corresponding to this somewhat obscure malady is a wasted or atrophic condition of the tissues within the nose. It is not known, with certainty, how the atrophy is brought about, or what is its precise relation to the fœtor which characterises the disease. The fœtor would appear, however, to be dependent to a great extent on the scanty secretion of mucus, and its tendency to dry up into crusts which decompose within the nasal cavity. It has been suggested that the particular kind of putrescence that occurs in ozæna may be due to the action of some specific microbe.

The **treatment** of these cases is mostly symptomatic and palliative, rarely radical and curative. The first indication is to remove *all* the crusts of inspissated and decomposing mucus retained within the nasal cavities. This is often a difficult matter.

The second indication is to prevent their formation or re-accumulation; and the third is to improve the general health so as to modify the morbid tendency.

The cleansing of the nasal cavities of the adherent crusts of mucus is usually effected by means of the nasal douche, which, when properly applied, allows the stream of cleansing lotion to flow in at one nostril and out at the other, making thus a complete circuit of the nasal passages. The fluid usually employed for this purpose is a warm solution of bicarbonate of sodium (1 per cent.), and a large quantity must be passed through the nose until all the crusts are removed; steaming the nose, or syringing it, or applying a probe covered with cotton-wool may be used as auxiliary means for removing portions of dry mucus not detached by the douche. Sulphur-water with 2 per cent. of potassium chlorate; tar-water with 1 or 2 per cent. of sodium chloride; a weak solution of sodium salicylate, or of carbolic acid; these have all been used for irrigation of the nasal fossæ. Schnitzler uses for this purpose a lotion made with 3 drams of ammonium chloride, 4 drams of sodium bicarbonate, and ten drops of carbolic acid to a pint of distilled water.

This cleansing process should be applied twice or thrice daily. As soon as the nasal cavities are completely cleansed, antiseptic and deodorising substances are applied either in the form of paints or injections, or sprays, or bougies, or insufflations.

Schnitzler uses as a paint, to be applied with a brush, zinc chloride, 16 grains, glycerine and water, of each ½ an ounce. Bamberger uses iodine 5 grains, potassium iodide 45 grains, dissolved in glycerine 10 drams. Löwenstein employs aristol, one part dissolved in ten parts of flexile collodion; or it may be used pure as an insufflation. He claims admirable results from its use. Rosenbach uses balsam of Peru; he paints the mucous membrane of the nose daily with it, and leaves in the nose, as deeply placed as possible,

a plug of cotton-wool soaked in it. Oil of turpentine has also been used.

As a spray Schnitzler uses a sublimate solution of 1 in 1,000, or the patient sniffs up a lotion consisting of 1½ drams of boric acid, 1½ drams of cherry-laurel water, and 8 ounces of water; or he prescribes an insufflation of equal parts of iodoform and roasted coffee in fine powder, or iodoform and benzoate of soda, of each 75 grains. Some prefer a spray of mentholised oil. Nasal bougies of iodoform, each containing $\frac{1}{6}$th of a grain, are used by Schrœtter.

Numerous other applications have been employed; some, after anæsthetising the mucous membrane by the application of a 4 per cent. solution of cocaine, apply pure tincture of iodine; some an insufflation of ten parts of boric acid and three of camphor, three or four times a day.

Recently* the application of *citric acid* by insufflation (citric acid, 75 parts; sugar of milk, 25 parts) has been highly commended in this affection, the crusts having been previously removed by alkaline washes. The powder is used three times a day. The fœtor is said to disappear rapidly under this treatment.

Curetting and also electrical cauterisation of the diseased membrane have been recommended by certain specialists.

In cases where any diseased bone can be discovered, this must of course be removed, and as these are likely to be syphilitic cases, appropriate general treatment must also be applied.

The general treatment must be determined by the individual character of each case. Some (scrofulous cases) will require cod-liver oil and the iodide of iron, others arsenic, others hypophosphite of lime, and all will need careful dieting and good air.

ACUTE LARYNGEAL CATARRH.

The remarks made with regard to the etiology of acute nasal catarrh, and with regard also to the

* *Practitioner*, August, 1900, p. 237.

prophylactic measures desirable to be taken by persons predisposed to that affection, apply with equal force to those who are prone to suffer from attacks of acute catarrh of the larynx.

The **treatment** appropriate to the acute attack itself in adults is also by no means dissimilar. In the early stage the advantage of small doses of opium, codeia, or morphine in allaying irritation and relieving the cough is most marked. It is well to combine them with small doses of ipecacuanha, or, better still, of tartarised antimony. The administration of an eighth of a grain of acetate of morphia with one-twelfth of a grain of tartarised antimony every four or five hours; or 4 or 5 grains of the compound ipecacuanha powder every five or six hours, will usually relieve most of the distressing *symptoms*—the tickling cough, the soreness in the larynx itself, the difficulty in swallowing sometimes present, and the hoarseness or impairment of voice. We have also found Schiefflin's pills of heroin (gr. $\frac{1}{24}$) and terpine hydrate (gr. $2\frac{1}{2}$) excellent for this purpose. Warm alkaline drinks are also of much value in thinning the tenacious adhesive mucus which often hangs about the glottis and upper part of the larynx, and is difficult of expulsion; for this purpose a third of a tumblerful of Ems, or Bourboule, or Apollinaris water, to which a tablespoonful or two of hot milk may be added, should be drunk every two or three hours; or the following mixture answers quite as well :—

℞ Sodii bicarbonatis ʒj.
Sodii chloridi gr. xxx.
Spiritus chloroformi ♏xxx.
Aquæ camphoræ ad ʒvj.
Misce, fiat mistura.

Of this mixture two tablespoonfuls should be taken every two or three hours with two tablespoonfuls of hot water or milk.

Some prefer ammonium chloride in 10-grain doses, instead of the sodium chloride in the above mixture,

and 5 minims of vinum ipecacuanhæ, or 10 minims of vinum antimonialis, may be given with each dose if the cough remains hard and dry.

Counter-irritation and warmth in the shape of a small poultice of mustard and linseed applied over the larynx are of great service. Some, however, prefer ice-cold compresses, and these are most useful if applied at the very beginning of an attack.

The following liniment is also of great service, when rubbed into the throat over and adjacent to the larynx :—

℞ Olei pini sylvestris ʒij.
Linimenti camphoræ compositi ʒiv.
Linimenti saponis ad ʒjss.
Misce, fiat linimentum.

If the bowels are confined and the tongue furred, a saline aperient will be useful; 2 or 3 drams of Carlsbad salts, or the same quantity of sodium sulphate in half a glass of hot water, will be the best.

It is of the greatest importance to avoid all causes of further irritation. The patient should therefore be kept to the house, and in one uniform temperature. All exercise of the voice should be forbidden, and the desire to cough should be so far as possible resisted.

The inhalation of the vapour of hot water or warm alkaline sprays containing some ammonium chloride (5 to 10 grains to the ounce) are useful when the cough is hard and dry and when there is difficulty in softening the tenacious and scanty mucous secretion.

Schnitzler considered the following solution applied with a hand-spray as the most efficacious of remedies :—

℞ Cocainæ hydrochloridi gr. iv.
Potassii chloratis gr. lxxv.
Aquæ laurocerasi ♏lxxv.
Essentiæ menthæ piperitæ... ♏iij.
Aquæ... ad ʒviij.
Misce, fiat mistura.

In severe attacks it is generally an advantage to

diffuse the steam of hot water through the atmosphere of the patient's room by means of a bronchitis kettle, or by any other suitable means for keeping the air charged with hot vapour of water.

Direct local applications are rarely advisable in cases of acute catarrhal laryngitis, but they are of great service if the catarrhal condition persists and the case becomes chronic.

Acute laryngeal catarrh in adults is usually not a serious disease, but in a *subacute* form it often occurs with troublesome frequency in persons who have to use the voice much in singing or speaking, and it is then more difficult to treat, and tends to become chronic.

Inhalations of the vapour of *tincture of benzoin* are very useful in this subacute form. Half a teaspoonful of the tincture should be inhaled from time to time from the surface of hot water. This is best done just before bed-time, or when the patient can remain in his room so as to avoid any exposure afterwards.

In **young children** acute laryngitis is often a grave malady on account of the attacks of nocturnal dyspnœa which frequently accompany it. These attacks often assume a very alarming aspect, and are constantly mistaken for attacks of true croup, especially by anxious parents.

A young child becomes affected with what is apparently a mild catarrhal affection, attended with a little sneezing and coughing, but without any dyspnœa or other alarming symptom : but in the middle of the night it wakes up with an alarming attack of dyspnœa, accompanied with loud stridulous inspiration, a dry hacking cough, and hoarseness of voice. The dyspnœa is often intense, and is attended with great restlessness and anxiety. Careful inspection of the throat will satisfy you that the attack is not due to any membranous or diphtheritic exudation. The dyspnœa is due to the fact that the larynx and glottis in young children are small and imperfectly developed,

and the catarrhal swelling of the mucous membrane, together, probably, with the accumulation during sleep of dry, tenacious mucus on the margins of the glottis, is sufficient to cause considerable laryngeal stenosis and inspiratory obstruction. In some cases spasmodic contraction of the laryngeal muscles no doubt contributes to the dyspnœa. As a rule, these attacks of dyspnœa pass off after a longer or shorter interval, and are unattended by danger; but the attacks have such a serious and alarming appearance, and the anxiety of the little patient's relatives is generally so great, that some active treatment is urgently demanded to allay their fears, and is usually rewarded with much apparent success.

Professor Widerhofer (Vienna) considers these attacks to be caused by drying of the *pharyngeal* mucous membrane during sleep, and that the proper treatment at first is to give the infant warm drinks—a tablespoonful of warm lemonade, or syrup—and to apply a warm wet compress to the throat, and to surround the child with the steam of hot water. In winter the air of the child's bed-room should be kept moist with the vapour of water, and the infant should be kept awake for an hour or two, so as to lessen the risk of developing the exciting cause.

If the child is a vigorous one, and there is turgescence of the vessels of the neck and face, no harm, and possibly some good, may be done by the application of a leech, or perhaps two, over the manubrium sterni. It is a proceeding which usually commends itself to the distressed parents, and it is a mistake to suppose that the abstraction of a small amount of blood in such cases can do any harm. The relief, indeed, so often afforded by this measure would seem to show that it does influence favourably the engorged or swollen or irritable laryngeal mucous membrane.

Hot sponges applied to the laryngeal region are useful; and while some think highly of a few small and rapidly repeated doses of aconite in these cases,

others think better of emetic doses of ipecacuanha and tartarised antimony. Certainly a quarter to a sixth of a grain of tartarised antimony with 30 to 60 minims of ipecacuanha wine, mixed with two or three teaspoonfuls of warm water, will often cut such attacks short in a striking manner, probably by thinning the tenacious mucus adherent to the laryngeal mucous membrane and obstructing the glottis.

After vomiting has been produced, it is well to keep up a slightly nauseating effect by small doses of ipecacuanha or antimonial wine every hour or two in some saline mixture; and the child's bowels should be acted upon with a few grains of calomel or grey powder and a grain or two of jalapine.

If, however, there is œdema of the glottis, which cannot be thus relieved, and scarification is impossible or fails to be efficacious, while the dyspnœa continues to be alarming, then tracheotomy must be performed.

Attacks such as these are usually limited to childhood; but it does occasionally happen that **œdema of the glottis** suddenly sets in in the course of an acute laryngitis in the adult. In such cases, if the dyspnœa is alarming and the laryngeal stenosis cannot be overcome by scarification, no time should be lost, but recourse had speedily to tracheotomy. Happily these cases in adults are very rare.

Scarification of the swollen epiglottis is not always an easy operation, and in children you can rarely avail yourself of the aid of the laryngoscope. If the mouth can be kept open the index finger may be used as a guide to the epiglottis, and a guarded curved bistoury used to puncture the œdematous organ. An emetic may be useful after scarification to mechanically press out the œdematous fluid. Small pieces of ice may be sucked, and hot sponges kept applied to the neck. But tracheotomy should not be unnecessarily delayed in these cases.

In cases in which there is constant irritative cough without any dyspnœa, from 1 to 6 grains of Dover's powder, according to the age of the child, should be

mixed with a few grains of sugar of milk, and divided into six powders, and one of these given every hour or two until the cough is relieved. To promote expectoration when this is difficult, as is the case with most children, the following mixture is useful :—

℞ Sodii chloridi gr. xvj.
Sodii bicarbonatis gr. xxiv.
Syrupi senegæ ʒiv.
Aquæ... ad ʒiv.

Misce, fiat mistura. A dessertspoonful (warm) every two hours.

Chronic Laryngeal Catarrh.

Repeated and neglected attacks of acute laryngeal catarrh lead to the establishment of a chronic catarrhal condition of the larynx, which is often tedious and difficult of cure. It is frequently brought on by overtaxing the vocal organs in public-speaking, singing, etc., so that it is common to find this affection amongst clergymen, public singers, and actors.

It is also, in some cases, due to an extension of a catarrhal condition from the pharyngeal mucous membrane, as in drunkards, and inveterate and immoderate consumers of tobacco. The hoarse voice of drunkards is well known. It also forms a part of the morbid changes which affect the larynx in phthisis and syphilis. We shall here only consider briefly the treatment of the simple form of chronic laryngeal catarrh characterised by three prominent symptoms—hoarseness, cough, and expectoration.

The treatment of this troublesome affection requires, first of all, the removal of the exciting cause. Absolute rest of the organ must be insisted upon in the case of public speakers, actors, and singers, and the advantage they often derive from a few weeks' residence and treatment at such spas as Cauterets, Eaux Bonnes or Mont Dore probably depends as much on the enforced repose and the healthiness of the out-door life they lead there in pure, tonic air, as on the use of the mineral waters of those springs.

Local applications are mainly to be relied upon in the treatment of this disease. These are applied to the larynx by the physician himself, usually by means of a brush and with the help of the laryngoscope.

Various astringent remedies are employed for this purpose, and each physician usually has his favourite remedy. Ziemssen extols the use of strong solutions of nitrate of silver, 16 grains and upwards to the ounce, and they are, doubtless, amongst the most efficacious remedies: the good effect lasts much longer than that of milder astringents, so that an application once a week or once a fortnight will suffice. Solis Cohen also thinks highly of painting the vocal cords, in obstinate cases of chronic laryngitis in those who have to use the voice much, with solution of nitrate of silver. He applies a solution of 10 grains to the ounce daily for a few days, then at longer intervals, and finally he applies, once a week, a solution containing 40 to 60 grains to the ounce. Others prefer the chloride of zinc (20 grains to the ounce), others chloride of iron (20 grains to the ounce), alum (10 grains to the ounce), tannin (10 grains to the ounce), and so on.

Inhalations of the vapour of oil of turpentine (five to twenty drops), or of pinol, with camphor, evaporated from the surface of hot water, are often useful. The inhalations should be used twice or three times a day for from ten to twenty minutes at a time.

When there is troublesome night cough a pill at bed-time of heroin (gr. $\frac{1}{24}$) and terpine hydrate (gr. $2\frac{1}{2}$) will be found very useful. This dose may be repeated during the night if necessary.

Insufflations of various powders are in common use in these cases: tannin, or alum, or boric acid, or bismuth subnitrate mixed with equal parts of sugar of milk, may be used, with or without the addition of a small amount of morphine hydrochloride.

In the intervals of, or as alternatives to, these applications, the use of astringent or alkaline *sprays*

may be beneficial. These may be applied with an ordinary hand-spray, but Seigle's steam-spray producer is, perhaps, the best apparatus for their production and application. As an astringent, a solution of tannin or alum, 5 grains to the ounce, is perhaps the best. The spray should be applied twice a day for about five minutes each time.

In cases where the mucous secretion is scanty and tenacious and difficult of removal from the mucous membrane and vocal cords, warm alkaline sprays are of much value. A solution of sodium bicarbonate and common salt, about 5 grains of each to the ounce, is one of the best. It is often advisable to cleanse the mucous membrane first with a warm alkaline spray before using the astringent applications. Three or four ounces of Ems or Bourboule water, drunk with a little hot milk, night and morning, will also be found useful in promoting the solution and expulsion of dry, inspissated mucus. We have seen very great and permanent as well as immediate benefit result from the diligent use of warm Bourboule water, applied locally to the larynx by means of a hand-spray, in subacute, irritable cases.

From the number of priests, singers, and actors with laryngeal catarrh found frequenting the springs of Mont Dore and La Bourboule, and also the sulphur springs of Eaux Bonnes and Cauterets in the Pyrenees, we may conclude that they derive benefit from these waters, as well as from the course of life prescribed for them at those places.

Schnitzler recommends that *massage* should be applied to the front and sides of the neck for two or three minutes at a time, the fingers of the operator being well covered with pomade.

One of the most efficacious remedies in the treatment of chronic or recurrent laryngeal catarrh is change of climate. In some instances a change from a low-lying or damp inland district to the sea-side, or to a more elevated and drier locality, is sufficient to bring about a cure, or very great amelioration.

But in more obstinate cases, and when it is practicable, removal to a more equable and milder winter climate than can be met with in Great Britain is desirable; the winter climate of Madeira, the Canaries, and some of the islands of the West Indies, or a sea voyage in southern seas, is perhaps best suited to the majority of cases. Some cases, however, do well in the drier climate of Egypt, especially persons who find themselves better in a dry and bracing atmosphere. High elevations are not suited, as a rule, to these cases, save in exceptional instances and in exceptionally fine seasons; the rapid changes of temperature, and the occasional occurrence of severe weather, with cold mists and heavy snow-falls, are apt to aggravate the catarrhal state of a sensitive larynx. Moderate elevations, however, such as that of Glion, or Cauterets, or Meran, often produce great benefit in these cases.

ADDITIONAL FORMULÆ.

Mixture for acute laryngitis.

℞ Liquoris morphinæ hydrochloridi, ʒij.
Vini antimonialis, ʒij.
Succus conii, ʒvj.
Liquoris ammonii acetatis, ʒij.
Aquæ camphoræ ad ʒx.
M. f. mist. A tablespoonful every four hours. (*Whitla.*)

Mixture for acute suffocative laryngitis in children.

After an Emetic.

℞ Kermes mineralis, gr. $\frac{2}{3}$ to $1\frac{1}{2}$.
Tincturæ aconiti, ♏ij. ad v.
Tincturæ belladonnæ, ♏vij. ad xv.
Syrupi floris aurantii, ʒj.
Aquæ anisi ad ʒv.
M. f. mist. A dessertspoonful every hour or half-hour. (*Simon.*)

For acute laryngitis in children.

℞ Apomorphinæ hydrochloridi, gr. $\frac{1}{4}$.
Acidi hydrochlorici diluti, guttæ iij.
Syrupi senegæ, ʒv.
Aquæ ad ʒjss.
M. f. mist. A teaspoonful every hour. (*Monti.*)

For the subacute laryngitis of vocalists.

1. An aperient.
2. A laryngeal spray of 1 per cent. solution of cocaine.
3. The following lozenges—

℞ Morphinæ bimeconatis, gr. $\frac{1}{100}$.
Cocainæ hydrochloridi, gr. $\frac{1}{12}$.
Tincturæ aconiti, ♏$\frac{1}{2}$.
Radicis althææ pulveris, gr. ss.
in each, one to be taken frequently.

4. As a preparation for a

vocal effort after acute symptoms have subsided, $\frac{1}{60}$ grain of strychnine after breakfast and lunch, and $\frac{1}{30}$ grain after dinner. (*Faulkner.*)

As an expectorant in catarrhal laryngitis in children.

℞ Potassii iodidi, gr. xv. ad xx.
Syrupi senegæ, ʒiij.
Aquæ ad ʒiij.
M. f. mist. A dessertspoonful every two hours. (*Monti.*)

Sedative spray or gargle in laryngitis.

℞ Cocainæ hydrochloridi, gr. viij.
Glycerini acidi carbolici, ʒij.
Aquæ rosæ ad ʒviij.
M. To be used occasionally as a gargle, and frequently as a spray. (*Whitla.*)

Tablets for acute coryza.

℞ Morphinæ, gr. $\frac{1}{12}$.
Atropinæ, gr. $\frac{1}{100}$.
Caffeinæ, gr. $\frac{1}{6}$.
M. (*S. S. Bishop.*)

For atrophic rhinitis.

Formalin in aqueous solutions, 1 in 1,000 to 2,000.
To be injected with nasal syringe. (*Bronner.*)

For laryngismus stridulus.

℞ Potassii bromidi, ʒij.
Chloral hydratis, ʒss.
Syrupi tolutani, ʒiv.
Aquæ, ad ʒij.
M. f. mist. A teaspoonful every half-hour for a child two years old.

Inhalation in acute catarrhal laryngitis to relieve heat and tickling in the throat.

℞ Aquæ laurocerasi, ʒjss.
Spiritus vini rectificati, ad ʒiij.
M. A dessert or tablespoonful to be inhaled night and morning. (*Schrœtter.*)

Inhalation or spray in chronic catarrhal laryngitis.

℞ Acidi tannici, gr. xv.
Spiritus vini rectificati, ʒijss.
Aquæ ad ʒij.
M. (*Schrœtter.*)

Inhalation for chronic laryngitis.

℞ Olei pini sylvestris, ʒij. ad ʒiij.
Magnesii carbonatis levis, ʒj. ad ʒjss.
Aquæ ad ʒiij.
A teaspoonful to be added to a pint of water at 150° F. and inhaled for five minutes two or three times a day. (*Mackenzie.*)

Gargle for hoarseness from fatigue of voice.

℞ Acidi tannici, ʒj.
Glycerini boracis, ʒij.
Tincturæ capsici, ♏xlv.
Infusi rosæ acidi ad ʒx.
M. f. gargar. To be used frequently. (*Whitla.*)

Treatment of chronic catarrhal laryngitis.

1. Drink infusion of pine cones (1½ dram to a pint of water).
2. A glass of sulphur water in the morning (Eaux Bonnes, Cauterets, or Enghien).
3. Inhale tar vapour.
4. Apply to the larynx the following solution:—
℞ Zinci chloridi, gr. xv.
Aquæ destillatæ, ʒj.
M. f. solut.
(*Nouveaux Remèdes.*)

Powders for catarrhal rhinitis

No. 1.

℞ Aluminis pulveris, ʒss.
Boracis, ʒss.
Menthol, gr. ⅓.
Zinci tannatis, gr. xlv.
Bismuthi tannatis, gr. xlv.
Lycopodii, ʒij.
M. f. pulv.

No. 2.

℞ Zinci salicylatis, ʒj.
Bismuthi tannatis, ʒj.
Boracis pulveris, ʒss.
Salol, gr. xx.
Talc, ʒij.
M. f. pulv.
(*Nouveaux Remèdes.*)

Snuff in chronic rhinitis.

℞ Cocainæ hydrochlor., grs. 2¼.
Camphoræ, grs. 1½.
Aluminis, grs. 1½.
Menthol, gr. ¾.
Sacchari pulv., 1½.
M. f. pulv. (*Maraval.*)

Application for deep ulcerations in ozæna.

℞ Aristol.
Ol. ricini, āā gr. 150.
Collodion, gr. 1,200.
M. To be applied on pledgets of cotton-wool. (*Foxino.*)

CHAPTER II.

THE TREATMENT OF CATARRHAL AFFECTIONS OF THE RESPIRATORY ORGANS (CONTINUED): ACUTE BRONCHIAL CATARRH.

ACUTE BRONCHIAL CATARRH.—*Prophylactic measures*—Treatment of different Forms—*Mild Forms*—Diaphoretics—Alkaline Waters—Tartarised Antimony—Opium—Aconite—Poultices—Aperients—Alkaline Expectorants—*Graver Forms*—Indications for Treatment—Leeches—Dry-cupping—Blood-letting—Counter-irritation—Tartarised Antimony and Opium—Stimulating Diaphoretic Drinks—Dangers of Opium—Inhalations—Cold Air—Aqueous Vapour—Alkaline Sprays—Conium and Belladonna Sprays—Compressed Air—Carbolic Acid Spray—Ipecacuanha and other Expectorants—Squills—Senega—Ammonia—Stimulants and Tonics—Potassium Iodide and Ammonium Chloride—Emetics—Oxygen Inhalation in Capillary Bronchitis of Children—Quinine and Arsenic in Febrile Cases—Alcohol—Ether—Digitalis—Strychnine—Lobelia—Chloroform Inhalation—*Diet*. Additional Formulæ.

IN considering the management of cases of bronchial catarrh, we shall first call attention to **prophylactic** measures.

Young children with a tendency to such attacks should be carefully guarded against exposure to chill, or to rapid and great changes of temperature; at the same time every opportunity should be taken to brace and harden them so as to diminish the morbid sensitiveness of surface upon which the liability to catarrhal attacks depends. In the warm season cold affusion or sponging should be cautiously practised, together with vigorous friction of the surface.

Abundant exercise in the open air, the child being warmly and suitably clad, with flannel next the skin, is of use also. But exposure on raw, cold, windy days must be especially guarded against, particularly with very young children.

The general nutrition of young children with this predisposition must also be looked to, especially if there is any tendency to scrofula or rickets. In such

cases the tonic influence of the phosphates of lime and iron and cod-liver oil is particularly noticeable.

With old people having a tendency to this malady great caution is necessary in protecting them from exposure to changes of temperature, to draughts, to cold, damp air, and they should not reside in cold, damp localities. They should pass the winter, when possible, in a warm, equable, sunny climate, or, if this is not possible, be content during the bad weather of the British winter and spring to remain in a set of apartments kept at a uniform temperature.

The **treatment** of **acute bronchial catarrh** will, necessarily, depend on the particular form of the malady with which we may have to deal. It may, and often does, occur as a comparatively slight malady, unattended with any risk or danger if ordinary care and caution in its management be adopted. On the other hand, it also often occurs as one of the most serious and dangerous maladies we encounter, frequently fatal, and taxing all our skill in its treatment. Much of its seriousness depends on the age and vigour of the patient attacked, on the extent of the bronchial surface involved, and on the complications that may attend it. An attack of acute bronchial catarrh may be limited entirely to the trachea and larger divisions of the bronchi, and show no disposition to spread beyond them. These are the slight cases, but an attack of acute bronchial catarrh may also be diffused over a wide extent of the bronchial surface, and extend even to the finest ramifications of the bronchial tubes. These cases of *capillary* bronchitis are of the gravest import. Such attacks prove very fatal to children and to feeble and aged persons, and are of great gravity even when affecting robust adults.

In the first place we shall consider the treatment appropriate to a **mild** case of acute bronchial catarrh in a previously healthy adult, and limited to the larger bronchi. Such an attack will usually be attended with a slight degree of fever; there will be more or less cough, usually at first dry and painful, attended

with a feeling of soreness or rawness referred to the upper sternal region. Dry, sonorous, rhonchal, and sibilant *râles* will be heard over both sides of the chest, loudest over the upper part. Usually there is but little dyspnœa, unless the attack be complicated with some spasmodic asthma.

The patient should be kept in bed in a room the temperature of which should at no part be lower than 65° F. nor higher than 70° F. The air of the room should be kept moist and unirritating by causing the steam of hot water, by means of a bronchitis kettle, to be freely diffused through the apartment. The treatment may often be advantageously commenced by putting the patient in a hot bath in which a bag of bran has been well wrung out. Warm mucilaginous or slightly alkaline drinks should be given freely, and varied according to the taste of the patient—barley-water, linseed tea, thin gruel; but many patients prefer a mixture of hot milk and seltzer, or Apollinaris, or soda water. These alkaline drinks have a beneficial influence on the secretion from the inflamed mucous membrane; they diminish its tenacity, and so promote expectoration, and in this way relieve the cough. The addition of 2 to 4 teaspoonfuls of cognac, whisky, or rum to 3 to 6 ounces of hot milk and seltzer water makes an excellent soothing expectorant drink.

But there is no remedy which relieves the distressing dryness of the mucous membrane in the early stage of acute bronchial catarrh so completely as **tartarised antimony.** Quite small doses of this drug, combined with small doses of morphia, codeia, or opium, will be found most efficacious in relieving these slight attacks of acute bronchial catarrh. We prefer it greatly to apomorphia, and think it a safer drug to handle. The opium relieves the irritating cough by lessening the sensitiveness of the bronchial mucous membrane, and the antimony greatly increases the secretion from it, and so relieves the dryness and swelling which accompany the first stage of

bronchial catarrh. Or a draught containing 5 to 10 grains of Dover's powder, 1 dram of spiritus ætheris nitrosi, 3 drams of liquor ammonii acetatis, and 1½ ounce of camphor water, at bed-time, and a saline aperient the morning following, is an excellent remedy in mild forms.

When there is much fever a few doses of aconite will be found useful at the commencement of the treatment, especially in young people. When there is not much fever, and the chief object is to relieve the cough and the dryness and soreness of the mucous membrane by promoting expectoration, this mixture may be given to adults :—

℞ Vini antimonialis ℥iss.
Liquoris morphinæ acetatis ℥ss.
Liquoris ammonii acetatis ℥iss.
Aquæ laurocerasi ℥ij.
Sirupi ℥iij.
Aquæ ad ℥vj.
Misce, fiat mistura. Two tablespoonfuls every 3 or 4 hours.

It should be given less frequently as the symptoms are relieved. In the case of persons who do not bear morphine well, *codeine* may be used in its place in the dose of ⅛ or ¼ of a grain.*

If there is much fever, the following is useful :—

℞ Tincturæ aconiti ♏ xij.
Vini antimonialis ℥ij.
Liquoris morphinæ acetatis ♏ xl.
Liquoris ammonii acetatis ℥iss.
Aquæ camphoræ ad ℥viij.
Misce, fiat mistura. Two tablespoonfuls every 2 or 3 hours.

If for young children the morphine should be omitted, and ½ an ounce of syrup of tolu added. The dose would be 1 or 2 teaspoonfuls according to the child's age.

* It must be remembered that old persons, many persons with weak hearts, or with chronic respiratory difficulty, or with renal disease, for the most part bear opiates badly, and their use should be avoided in such cases.

Much relief is also given by a large hot poultice of linseed and mustard, applied over the top of the chest in front, and also behind, between the scapulæ.

An aperient is often necessary and useful. One or two grains of extract of aloes with 1 grain of powdered ipecacuanha in a pill at bed-time, and the following morning two teaspoonfuls of Carlsbad salts in half a tumblerful of hot water, will be found an effectual purge, and if the tongue is thickly coated, and the urine high-coloured, ½ a grain of calomel may be added to the pill.

With this treatment in those milder forms, the acute stage will rarely last more than a day or two, and the white, scanty, frothy, sticky expectoration of the first stage will be replaced by a more abundant, muco-purulent secretion. This change in the character of the secretion is an indication that the attack is passing off. It is now desirable to discontinue the antimony and the morphine, or to give them only at night for the relief of cough. It should be borne in mind that remedies like opium, antimony, and aconite are only given to relieve definite symptoms, and when those are relieved these drugs should be at once discontinued.

An alkaline, mildly stimulating expectorant is now useful, such as the following:—

℞ Infusi senegæ ℥iij.
Sodii bicarbonatis... ʒj.
Sodii chloridi } āā gr. xxiv.
Ammonii carbonatis }
Syrupi tolutani ℥iij.
Aquæ ad ʒvj.

Misce, fiat mistura. Two tablespoonfuls every six hours.

A pill of a grain and a half of quinine, and a quarter or half a grain of powdered ipecacuanha, may at the same time be given twice or three times a day, and will promote convalescence.

A tablespoonful of brandy or whisky in a teacupful of hot milk and water, two or three times a day, is an excellent expectorant.

With this method of treatment patients may usually be carried safely through these commoner and slighter forms of acute bronchial catarrh.

Next as to the treatment most appropriate to the **graver** forms of **acute bronchitis:** to those cases in which the catarrhal inflammation is diffused over a great extent of the bronchial mucous membrane, and affects not only the larger tubes, but those also of medium size, and sometimes even the smaller ramifications.

Such cases, when they occur, even in vigorous adults, are very grave, and require most careful management; but when they occur, as they often do, in young and delicate children or in old and feeble persons, they are attended with the greatest danger.

When the finer bronchial tubes become attacked, and their calibre diminished by the inflammatory swelling of their lining membranes, and when many of them become blocked up by the accumulation in them of viscid secretion, it can readily be understood how imminent must be the danger of death by apnœa.

The objects we should keep in view in the treatment of such cases are these:—*a.* To diminish the inflammatory hyperæmia and swelling of the bronchial mucous membrane. *b.* To thin and liquefy the catarrhal secretion when it is dry and scanty. *c.* To lessen it when excessive. *d.* To promote its expulsion from the air-passages, and so obviate their obstruction. *e.* To allay excessive sensibility of the bronchial mucous membrane. *f.* To maintain and promote the circulation in the lungs, and prevent pulmonary engorgement and distension of the right side of the heart. *g.* To reduce fever and maintain the general strength.

The several details of treatment by which these indications may be carried out will have to be modified and adapted to individual cases.

Much will necessarily depend on the age and vigour of the patient, as well as on the stage which the disease has reached when it first comes under

treatment. Remedies most appropriate in the earliest stage, and in a young and vigorous adult, might be altogether unsuited to more advanced stages, to a young child, or to an old and feeble person.

We will first consider the treatment of a severe attack of acute bronchitis in a young and robust adult seen at its onset. The air of the apartment must be kept warm and moist, as already pointed out.

If there is much oppression of breathing referred to the upper part of the sternum, half-a-dozen leeches applied over the manubrium sterni will be a judicious method, and with this may be associated dry cupping over the back of the chest and in the interscapular regions. This measure will afford much relief in robust persons when the dyspnœa and sense of oppression are severe.

General bleeding is rarely necessary; it may, however, be had recourse to in certain very acute cases, when the dyspnœa is extreme, the surface livid, and the danger of death from apnœa imminent. The removal of a few (6 or 8) ounces of blood will relieve the engorgement of the right side of the heart, and, at the same time, the pulmonary venous congestion. "The disease is not arrested by this treatment, but a special danger is averted, and time is gained for the employment of other measures" (*Wilson Fox*). But venesection is never desirable in children, nor in old or debilitated persons.

In most cases it will be advisable to apply large linseed and mustard poultices over the front and back of the chest; and when the skin is too tender to allow of further counter-irritation, a hot jacket-poultice of linseed meal must be used instead.

The hot jacket-poultice probably acts by dilating the vessels of the surface, and so reducing blood-pressure in the veins and the right side of the heart, whilst by its heat it acts as a cardiac stimulant.

We do not think any form of counter-irritation acts better than the linseed and mustard poultice

when well made and carefully applied. But it is sometimes made badly, and applied carelessly, so that it is not very unusual to find a poultice around the patient's loins instead of his chest!

We would call *special* attention to the importance of applying these moist poultices carefully, *neatly*, and accurately. We occasionally see patients in a state of great discomfort from the untidy application of moist cloths and poultices to the chest, which soon lose their warmth and become a source of danger as well as discomfort. It is better to apply hot, *dry* flannels sprinkled with turpentine than unskilfully made poultices. Indeed, we think the application of the moist poultice is often overdone, and continued too long. After a time it is better to replace it with a simple layer or two of warm cotton-wool sprinkled with a little turpentine or pine oil, especially when the patient complains of discomfort from the moist application.

Of internal remedies we are quite of Stokes's opinion that "there is no remedy that possesses such a decided power over acute bronchitis" as **tartarised antimony**; but its success depends much on its early administration, *i.e.* when the bronchial mucous membrane is dry and tumid, before secretion has become abundant, and when the skin is hot and dry and the pulse hard and frequent. It should be given in quite small repeated doses, combined with other diaphoretics, viz. 10 to 20 minims of the antimonial wine for adults, and 5 to 10 minims for children. In these small doses it often produces less nausea than ordinary doses of ipecacuanha.

℞ Vini antimonialis ʒij.
Spiritus ætheris nitrosi ʒiv.
Liquoris ammonii acetatis ʒij.
Tincturæ camphoræ compositæ ʒij.
Aquæ ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls every three or four hours.

Warm alcoholic drinks are needed to keep up the force of the circulation, while, at the same time, they

favour diaphoresis, reduce fever, and promote expectoration. Two or three ounces of hot milk, with an equal quantity of seltzer or soda water and a dessert-spoonful of brandy or whisky, should be given every three or four hours.

The advantage of procuring profuse *diaphoresis* is undoubted; whether it acts by derivation from the bronchial mucous membrane, or in some other way, it is certain that it is constantly attended with marked relief to the catarrhal symptoms.

Free evacuation of the bowels should be regularly obtained, so as to favour the descent of the diaphragm and afford as complete expansion of the lungs in breathing as possible; while by unloading the portal system of veins, any tendency to distension of the right side of the heart is to that extent relieved. For adults it is as well to give at bed-time occasionally ½ a grain of calomel in a pill with a grain or two of the watery extract of aloes, and a teaspoonful of Carlsbad salts, dissolved in hot water, the following morning. In the case of children ¼ of a grain of calomel may be given with 2 to 5 grains of compound scammony powder.

It is necessary to insist strongly on the importance of using the *greatest discretion* in the administration of opium in these cases of severe diffused acute bronchial catarrh. The more diffused the catarrh the more cautious must we be in the administration of opium. In old people and in young children opium is scarcely at all admissible, and even in adults, where there is much obstruction to the entrance of air into the lungs from the abundance of secretion in the air-passages, opium is a very dangerous drug.

The effect of opium is to check cough and diminish secretion; the former it does partly by lessening the sensitiveness of the bronchial membrane, and the latter by modifying the capillary circulation in it. But in cases of "suffocative" bronchitis, while we might desire to diminish the secretion, we dare not deaden the sensitiveness of the bronchial mucous

membrane, or do anything to check the cough. So long as the air-passages are obstructed by catarrhal exudation we depend upon the cough to clear and set free the obstructed air-passages, and we only desire to make it more efficient to that end.

It is extremely important to bear this in mind in connection with the use of opium in bronchial catarrh; a dose of opium given injudiciously may produce a fatal somnolency, and, by quieting the cough, lead to fatal blocking up of the air passages.

If you give opium at all in such cases, give it only in very small doses, and only when the patient is watched by some thoroughly trustworthy person; but never give it at night to procure sleep, however trying the cough may be, or however urgent the patient or the attendants may be for a sedative.

Remember that opium is rarely ever admissible in the diffuse bronchial catarrhs of old persons and young children. When it is very necessary to secure a few hours' sleep, it is better to give from 5 to 15 grains of trional, with an equal quantity of bromide of sodium; and then the patient must not be allowed to sleep more than two or three hours at a time, unless the respirations are free and regular, for the secretions tend to accumulate in the bronchi during sleep, and hinder the access of air to the air cells. It is often necessary to give the patient on waking from sleep some diffusible stimulant to aid him to expel the mucus which has accumulated in the air-passages. A little brandy with hot milk and seltzer water is best for this purpose.

An agreeable and useful atmosphere for the patient to inhale is produced by dropping twenty or thirty drops of *pinol* on to the water in a bronchitis kettle; the vapour of the pinol is thus diffused through the room together with the hot aqueous vapour given off by the water in the kettle.

In the acute bronchial catarrhs of children, especially those accompanying infective diseases, such as measles and pertussis, we have found the frequent

inhalation of a warm spray containing bicarbonate of soda and glycerine of carbolic acid of the greatest service in promoting expectoration.

We use the following proportions :—

℞ Sodii bicarbonatis gr. x.
Glycerini acidi carbolici ʒj.
Aquæ destillatæ ℥j.
Misce, to be used warm.

By means of a Seigle's steam-spray producer the spray should be allowed to play freely before the child's mouth and nose, so that he *must* inhale it with the inspired air.

As soon as the first stage is over, and the scanty and tenacious glairy secretion has been replaced by an abundant muco-purulent one, we must discontinue the use of tartarised antimony, or replace it by small doses of ipecacuanha; and now is the appropriate period for the administration of the stimulating expectorants, such as *squills* and *senega*, in combination with carbonate of ammonia.

Spirit of chloroform is also an excellent expectorant, while it at the same time soothes and allays the cough.

A suitable formula is the following :—

℞ Infusi senegæ ℥iv.
Ammonii carbonatis gr. xxxij.
Tincturæ scillæ ♏ clx.
Spiritus chloroformi ʒij.
Aquæ ad ℥viij.
Misce, fiat mistura. Two tablespoonfuls every four or five hours.

If the cough remains troublesome, it may be advantageous to add to each dose of the above mixture 5 minims of wine of ipecacuanha and 20 minims of compound tincture of camphor.

On the other hand, as convalescence advances, the tincture of squills in the above mixture should be replaced by 1-dram doses of tincture of cinchona.

In all such cases symptoms of debility and loss of power must be immediately encountered by the administration of alcoholic stimulants.

In *debilitated* persons, and when we do not encounter the case in its earliest stage, a combination of carbonate of ammonia, ipecacuanha (in small doses), and bark, as in the subjoined formula, with warm stimulating drinks, and the inhalation of warm alkaline sprays to thin the secretions—these are the measures to be relied upon.

℞ Ammonii carbonatis gr. xl.
Vini ipecacuanhæ ♏xx.
Tincturæ cinchonæ ℥v.
Aquæ chloroformi ad ℥viij.
Misce, fiat mistura. Two tablespoonfuls every four hours.

In somewhat advanced cases, especially in the rheumatic or gouty, when the expectoration is tenacious, scanty, and difficult of expulsion, potassium iodide is a most valuable remedy: it may be combined with sodium chloride, as in the following formula:—

℞ Potassii iodidi gr. xl.
Sodii chloridi gr. lxxx.
Ammonii carbonatis } āā gr. xl.
Sodii bicarbonatis }
Tincturæ senegæ ℥iv.
Aquæ chloroformi ad ℥viij.
Misce, fiat mistura. Two tablespoonfuls, with two of hot water, three or four times a day.

In the case of young children who cannot expectorate, we must give occasional **emetics.** Ipecacuanha is the best. Twenty grains of powder of ipecacuanha mixed with a tablespoonful of syrup and water will usually have the desired result. The effect of the emetic is not only to promote expectoration, but by the mechanical compression of the lung it induces it tends also to relieve congestion. The sticky mucus which accumulates in the child's mouth after vomiting should be carefully removed.

Some prefer the hydrochloride of apomorphia as an emetic in these cases. One-twentieth of a grain injected hypodermically can usually be relied upon to produce vomiting in ten minutes. When a

child cannot be induced to swallow an emetic, this is obviously a valuable alternative; the objection to its use is that it sometimes produces great depression.

Emetics are also useful in cases other than those of children, when, owing to debility of the bronchial muscles, the catarrhal secretions are retained in the air-passages. This state "may be detected when, immediately after the act of coughing, the *râles*, instead of subsiding for a time, persist with scarcely any diminution. In such an emergency, should the expectorants fail, an emetic is imperatively indicated" (*Niemeyer*). Ipecacuanha or zinc sulphate should be used.

In order to ward off the danger of pulmonary collapse in young children, the child may be roused to more active respiratory efforts by putting him into a hot bath, and sprinkling cold water on the chest while in it. Nor should he be allowed to fall into a prolonged or deep sleep, but should be aroused from time to time, and some stimulant given.

The *inhalation* of *oxygen* has been found of remarkable value in some cases of capillary bronchitis in infants after all other means have failed. It has rapidly relieved the dyspnœa and the cyanosis, and led to ultimate recovery.

In cases in which there is a tendency to the maintenance or recurrence of fever, quinine must be given, or, if this is not well tolerated, arsenic. The latter drug may be given in combination with nux vomica, ammonia, and cinchona, as follows:—

℞ Liquoris arsenicalis ♏xxiv.
Tincturæ cinchonæ compositæ ʒj.
Tincturæ nucis vomicæ ʒijss.
Ammonii carbonatis gr. xxxij.
Aquæ chloroformi ad ʒviij.
Misce, fiat mistura. Two tablespoonfuls three times a day.

Quinine may be given in combination with expectorants, as in the following prescription:—

℞ Tincturæ senegæ ʒiv.
Tincturæ nucis vomicæ ʒijss.
Spiritus chloroformi ʒiij.
Tincturæ quininæ ammoniatæ ... ad ℥iij.
Misce, fiat mistura. Two teaspoonfuls in a wineglass of water three times a day.

In aged patients, and especially when acute bronchitis is accompanied by old emphysema of the lungs, together with dilatation of the right side of the heart, there is often difficulty in promoting expectoration and in maintaining cardiac action. In such cases we must give stimulants freely—a tablespoonful of brandy or whisky, with a little hot milk and seltzer or Apollinaris water, every hour; or in some cases champagne may be given if the patient prefer it.

A mixture of ether, ammonia, and digitalis may be of use to stimulate the failing cardiac power :—

℞ Tincturæ digitalis ♏c.
Spiritus ætheris ʒiv.
Ammonii carbonatis... gr. xl.
Aquæ ad ʒviij.
Misce, fiat mistura. Two tablespoonfuls every two or three hours while necessary.

Or the action of the heart may be maintained by hypodermic injections of strychnine, and the dyspnœa relieved by oxygen inhalations. Strychnine acts powerfully on the respiratory centre, and its administration is an invaluable expedient in the later exhaustive stages of acute bronchitis.

Spasmodic dyspnœa, with dry *râles*, may require the administration of the ethereal tincture of lobelia. This may be given combined with ammonia and small doses of morphine, remembering the caution we have already given about the use of the latter drug.

℞ Tincturæ lobeliæ atheriæ ʒi.
Ammonii carbonatis ʒss.
Liquoris morphinæ hydrochloridi ... ʒj.
Aquæ ad ℥vj.
Misce, fiat mistura. One or two tablespoonfuls every two or three hours until relieved.

The inhalation of chloroform may sometimes be necessary to relieve spasmodic dyspnœa. If the dyspnœa is caused or aggravated by intestinal flatulence, and if this has arisen from an unwise disinclination to keep the bowels well relieved by aperients, the desirability of which we have repeatedly insisted upon, then we may administer a turpentine or rue enema, and give the following pills and draught: 5 grains of the compound rhubarb pill with 5 grains of the aloes and asafœtida pill, followed by a draught containing 2 drams of sulphate of soda, 3 drams of tincture of senna, and 1½ ounces of caraway water.

The **diet** during an attack of acute bronchitis of any severity should be *fluid* in the main. Milk when it is well borne and easily digested is excellent—it should usually be given warm. Nourishing soups, gruels, and broths which favour diaphoresis should also be given. Beaten-up eggs, the yolks of lightly boiled or poached eggs, and custard pudding, are all useful. Light puddings, tapioca, ground-rice, or arrowroot, are permissible, and if the tongue is fairly clean a little pounded meat or chicken may be added to the animal broths. An occasional cup of light tea is refreshing and stimulating. In the slighter cases fish and chicken may be allowed. In convalescence we should prescribe a nourishing diet carefully adapted to the digestive capacities of individual patients.

In severe cases, the patient's position in bed should be arranged so as to counteract the tendency to passive or hypostatic congestions; he should, therefore, be almost raised to the sitting position, and he should not be allowed to rest long on one side.

ADDITIONAL FORMULÆ.

Powders for acute bronchitis with abundant stringy expectoration difficult to expel.

℞ Acidi benzoici, gr. xij.
Pulveris gummi acaciæ, gr. lxxv.
M. et divide in pulv. vj. A powder every two hours.
(*Bamberger.*)

Powders to relieve the cough of acute bronchitis.

℞ Morphinæ hydrochloridi, gr. jss.
Pulveris ipecacuanhæ, gr. iij.
Sodii bicarbonatis, gr. lxxv.
Sacchari albi, gr. lxxv.
M. et divide in pulv. xij. One every six hours.
(*Bamberger.*)

Mixture for acute bronchitis in children.

℞ Vini antimonialis, ʒj.
Vini ipecacuanhæ, ʒj.
Liquoris ammonii acetatis, ʒiv.
Syrupi tolutani, ʒiv.
Aquæ ad ℥ij.
M. f. mist. A teaspoonful every two hours for a child two years old. (*Whitla.*)

Mixture for acute bronchitis.

℞ Ammonii chloridi, gr. xxx.
Tincturæ opii, ♏vij ad xv.
Syrupi senegæ, ʒvj.
Decocti althææ (1 in 10 or 20) ad ℥viij.
M. f. mist. Two tablespoonfuls every two hours.
(*Bamberger.*)

Mixture for acute capillary bronchitis.

℞ Vini antimonialis, ʒiv.
Spiritus chloroformi, ʒiv.
Spiritus ammoniæ aromatici, ℥j.
Liquoris ammonii acetatis, ℥ij.
Aquæ ad ℥viij.
M. f. mist. A tablespoonful every two hours. (*Whitla.*)

Mixture for acute bronchitis.

℞ Tincturæ veratri viridis, ♏xx.
Vini antimonii, ʒiv.
Tincturæ opii camphoratæ, ℥ijss.
Liquoris ammonii acetatis, ℥ij.
M. f. mist. A teaspoonful in a tablespoonful of water every two, three, or four hours (smaller doses for children).
(*Prof. Davis, M.D., Chicago.*)

Spray for inhalation to relieve cough from excessive hyperæsthesia of bronchial mucous membrane.

℞ Extracti conii maculati (dissolved in rectified spirit), gr. iij.
Aquæ laurocerasi, ♏xx.
Potassii carbonatis, gr. viij.
Aquæ destillatæ, ℥j.
M. f. inhal. To be used warm. (*Lewin.*)

Belladonna spray for bronchitis and asthma.

℞ Extracti belladonnæ, gr. ⅔.
Aquæ, ℥ss.
M. f. sol. To be used with a Seigle's spray-producer every few hours.
(*Dr. Davies, of Sherborne.*)

Cocillana (bark) and **naregamia** (root) have been introduced in America as expectorants in "dry catarrhs," and as preferable to tartarised antimony. The dose of the former is 10 grains of the powdered bark every four or six hours, and of the latter 20 grains of the powdered root. Little is really known at present about these drugs.

CHAPTER III.

THE TREATMENT OF CATARRHAL AFFECTIONS OF THE RESPIRATORY ORGANS (CONTINUED): CHRONIC BRONCHIAL CATARRH.

CHRONIC BRONCHIAL CATARRH.—*Etiology*—Varieties: "Chronic Winter Cough"—"Dry" Catarrh—Pituitous Catarrh or Bronchorrhœa—Bronchiectasis—Bronchitis Putrida—Physical Signs—Indications for Treatment—Treatment of Ordinary Winter Cough—of Dry Catarrh—Alkaline Drinks and Sprays—Hot Aqueous Vapour for Inhalation—Mineral Waters—Ems—Apollinaris—Bourboule—Selters—Formulæ—Saline Aperients—Potassium and Sodium Iodide. BRONCHORRHŒA—Balsams and Gum Resins—Copaiba—Turpentine in Mixtures and Inhalations. INHALATION RESPIRATOR.—Derivatives from Turpentine—Terpine—Terpinol—Terebene—Tar—Creasote—Menthol—Balsams of Peru, Tolu, Benzoin, and Storax—Ammoniacum—Squills. BRONCHITIS PUTRIDA.—Antiseptic Inhalations—Santal Oil—Myrtol—Cod-liver Oil—Astringent Sprays for profuse Secretion—Acetate of Lead, Alum, Tannin, Perchloride of Iron, etc.—Senega—Value of an occasional Emetic—Mechanical Compression—Counter-irritation—Pneumatic Treatment—Climate—Mineral Waters—Treatment of Associated Constitutional Tendencies. Additional Formulæ.

THERE is, perhaps, no disease which is met with more frequently in Great Britain than **chronic bronchial catarrh.** The insular, humid, changeable climate is especially favourable to the maintenance of catarrhal conditions of the air passages when once they are established.

The *chronic* form of bronchial catarrh is often the result of repeated *acute* attacks, or it is due to continued exposure to unfavourable meteorological conditions. It is often secondary to other diseases—to typhoid fever, to heart disease, to phthisis. It is sometimes caused by occupations which entail exposure to irritating dusts or gases. It is frequently associated with pulmonary emphysema, in the production of which it plays a predominant part. It is often encountered in connection with the gouty diathesis as well as in association with rheumatism, scrofula, and syphilis. But whatever may be the

predisposing causes, the two *exciting* causes, apart from mechanical or chemical irritants, are almost invariably an inherited or acquired hyper-sensitiveness of the bronchial mucous membrane, and exposure to atmospheric vicissitudes.

It is met with at all ages, and is most troublesome to deal with and most dangerous at the two extremes of infancy and old age. It is sometimes comparatively slight, recurring regularly in severe weather in the form of what we call a chronic *winter* cough. There is also the "dry" form, the *catarrhe sec* of French authors, characterised by violent irritative cough, and scanty, tenacious expectoration difficult of expulsion. This is regarded by some as a "gouty" form. There is also the form, attended by abundant muco-purulent secretion, the "*catarrhe pituiteux*" of the French; the "bronchorrhœa" of other writers.

Occasionally chronic bronchial catarrh is accompanied by structural changes in the walls of the bronchi, leading to dilatation of these tubes, and to the formation of the so-called **bronchiectatic** cavities.

The stagnation and decomposition of bronchial secretion in these cavities may impart an offensive odour to the breath and to the sputa, and this may also arise from putrid ulceration of the bronchial mucous membrane, giving rise to what is termed *bronchitis putrida*, or fœtid bronchitis.

It is scarcely necessary to enumerate the familiar symptoms and physical signs of this very common malady: the cough more or less severe, the expectoration more or less abundant, the dyspnœa more or less grave, according to the extent of the diffusion of the disease or the presence of complications; the combination of good, often exaggerated, percussion resonance with diffused harsh respiration, and various sonorous *râles*, rhonchal and sibilant, crepitating and humid, or musical and dry, while gurgling *râles* are heard over the bronchial dilatations. In some cases there is notable emaciation.

The **indications for treatment** will vary with the nature of the case.

It is, in the first instance, important to remove all source of injury or irritation to the bronchial mucous membrane, in which the disease may have originated, or which may favour its continuance.

If it is dependent on occupation, change it; if on climate, let your patient seek a better one. Is it dependent upon the existence of some other disease or constitutional state, as heart disease, syphilis, scrofula, gout, etc., then our remedies must be selected with due regard to the original disease or diathesis.

There are other indications for treatment which may be deduced from the symptoms of the disease itself. These are:

a. To modify the morbid secreting action of the bronchial mucous membrane.

b. To promote the expulsion of the morbid secretions which tend to accumulate in the air-tubes.

c. To calm irritative cough.

d. To give tone to the enfeebled bronchial walls.

e. In fœtid bronchitis, to suppress the putrid decomposition of the bronchial secretions.

Little is needed in the way of medical treatment for those slight forms of bronchial catarrh which are almost habitual with some persons during the winter. General hygienic measures should be prescribed, such as sufficiently warm clothing, residence in dry and protected localities, and in well-warmed and well-ventilated apartments; avoidance of all exposure to draughts or chills of any kind. A respirator may sometimes be worn with advantage during cold, damp weather. The food should be light and nutritious, and the bowels kept open by gentle saline aperients. The most troublesome symptom in these cases is usually a more or less harassing cough on rising in the morning, with some expectoration which may at times be difficult to expel. The best remedy for this is 5 or 6 oz. of an alkaline water, such as Ems or Apollinaris, with a little *boiling* milk, early in the morning.

In cases of "**dry catarrh**" we meet with severe paroxysms of cough, attended by a very scanty secretion, which is tenacious and sticky, and difficult of expulsion, and when it is expelled is in the form of small pearly masses. The seat of this form of catarrh is in the smaller bronchi, and it is often associated with the gouty constitution. These cases are greatly benefited by the free administration of warm alkaline drinks and the inhalation of hot saline alkaline sprays, or the steam of hot water. The mineral waters of Ems, Apollinaris, Bourboule, and Selters are excellent for this purpose. Four to six ounces of Ems or Apollinaris, with two ounces of hot milk or whey, should be taken four or five times a day, and the hot spray of these waters inhaled twice a day or oftener.

If these mineral waters are not available, a very good substitute is a mixture containing bicarbonate of soda and chloride of sodium, and with this mixture we may often advantageously combine some pills containing tartarised antimony (or ipecacuanha) and morphine, the latter for the purpose of allaying the irritative, hyperæsthetic condition of the bronchial surface, the former to increase the amount and fluidity of the bronchial secretion, and so facilitate its expulsion.

The following prescription is useful :—

℞	Sodii bicarbonatis	ʒj.
	Sodii chloridi	ʒss.
	Ammonii carbonatis	ʒss.
	Spiritus chloroformi	ʒij.
	Aquæ	ad ℥vj.

Misce, fiat mistura. Two tablespoonfuls, with two of hot water, every four to six hours.

℞	Antimonii tartarati	gr. ⅛
	(*vel* pulveris ipecacuanhæ, gr. j.)	⅛
	*Morphinæ acetatis (*vel* codeinæ, gr. ss.)	gr. ¼
	Extracti hyoscyami	gr. j.

Misce, fiat pilula. To be taken at bed-time.

* Refer to what is said at page 532, *ante*, as to the use of opium in these cases. The morphine should not be prescribed for the aged.

Codeia should be preferred for gouty persons.

In the gouty this treatment should be combined with a saline aperient every morning, such as one or two teaspoonfuls of Carlsbad salts in a glass of hot water.

Potassium, sodium, and ammonium iodides are valuable remedies in gouty forms of chronic bronchitis; 3 to 5 grains of either may be added to each dose of the preceding mixture.

Potassium and sodium iodide also prove of much benefit when there is a tendency to asthma, and the bronchial secretion is tenacious and difficult of expulsion; large doses, from 5 up to 15 grains, of potassium iodide may be required to relieve these attacks of dyspnœa in this form of chronic bronchial catarrh.

In cases of chronic bronchial catarrh with profuse secretion, or **bronchorrhœa**, the object of our treatment should be to modify the morbid secreting action of the bronchial mucous membrane. Several drugs are believed to possess this power in some degree; notably, certain "balsams" and "gum resins." Copaiba, turpentine, tar, creasote, the balsams of Peru and of tolu, ammoniacum, are members of this group of remedies.

Some of these drugs contain substances which are eliminated by the bronchial mucous membrane, and may thus exercise a local influence over the existing morbid conditions.

Copaiba is often given combined with tar in capsules, or according to the following formula:—

℞	Copaibæ	ʒij.
	Mucilaginis acaciæ	ʒvj.
	Spiritus chloroformi	ʒss.
	Aquæ camphoræ	ad ℥vj.

Misce, fiat mistura. Two tablespoonfuls three times a day.

Turpentine is more agreeable and as efficacious. It may be prescribed in capsules. Or it may be given as an emulsion, thus:—

℞ Olei terebinthinæ ʒi.
Mucilaginis acaciæ ʒij.
Misturæ amygdalæ ad ʒvj.
Misce, fiat mistura. One or two tablespoonfuls for a dose.

Turpentine is also well and readily administered by inhalation. A teaspoonful of the oil of turpentine may be vaporised from the surface of hot water, and directly inhaled with the vapour of water from any

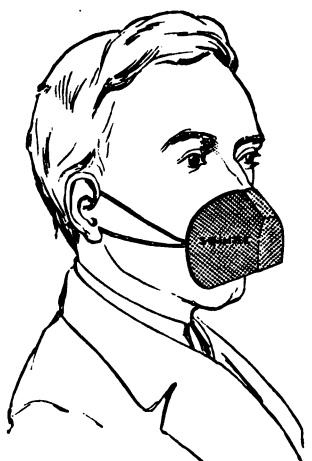


Fig. 15.—Dr. Yeo's Respirator.

suitable vessel, or twenty or thirty drops of spirits of turpentine may be added from time to time to the water in a bronchitis kettle, when its vapour will be quickly diffused into the room; or the patient may wear a light perforated zinc **inhalation respirator** *, the sponge of which is charged from time to time with spirits of turpentine (Fig. 15).

Professor S. Solis Cohen says this is "one of the

* This little inhalation respirator was devised by the author, and is made by Messrs. Squire, 413, Oxford Street, London. Messrs. Wyeth, of Philadelphia, also make it in a slightly modified form.

most useful, as it is one of the simplest, devices for the inspiration of medicinal vapours."*

Various *derivatives* from turpentine have been used in the treatment of chronic bronchial catarrh.

Terpinol and *terpin hydrate* are very popular in France. *Terpinol* is an oily substance with a jasmine-like odour; it is said when taken internally to be wholly eliminated by the respiratory passages. It is best given in capsules, five to ten daily, each containing a minim and a half; also in pills according to a formula to be found at the end of this chapter.

Terpin hydrate is a white crystalline body, "*bihydrate de térébenthène*," and it seems to act on the respiratory mucous membrane in the same way as turpentine, but it has the advantage of not disturbing the digestive organs. Lépine has used it with great success in cases of bronchorrhœa. It is only slightly soluble in alcohol, so it is best to give it mixed with alcohol and glycerine:

℞ Terpin hydrate gr. lxiv ad lxxx.
Alcohol ʒv.
Glycerin ad ℥ij.

Misce, fiat mistura. A teaspoonful in some aromatic water three or four times a day.

Pills containing terpin hydrate (gr. 2½ or gr. 5) and heroin (gr. $\frac{1}{24}$) are made by Schiefflin, and are very useful in catarrhs of the larger bronchi.

Terebene has also been given for the chronic form of winter cough. It may be given in capsules, or dropped on sugar, in doses of 5 to 20 minims; or it can be made into an emulsion with mucilage of tragacanth, or inhaled as a spray, or from the sponge of the little respirator just described.

Tar is another remedy for bronchial catarrh; it is frequently given in the form of capsules, or as *tar-water*, or in pills, and as an inhalation. It is of value in the treatment of chronic bronchial catarrh. It is an expectorant, as well as a tonic to the bronchial

* Hare's "System of Practical Therapeutics," vol. i., p. 829.

mucous membrane, and it has been suggested that it exerts its beneficial tonic effect on the respiratory mucous membrane in the act of its elimination, stimulating the epithelial elements and their cilia.

Tar-water can be made by stirring one part of tar with ten of water for fifteen minutes, and decanting. A wineglassful may be taken several times a day.

Tar can also be made into pills either with liquorice-powder or powdered gum acacia. Equal parts of tar and liquorice-powder may be mixed together and made into 5-grain pills, two or three of which should be taken three times a day.

Or the syrup of tar of the United States Pharmacopœia can be used. A stronger form can be obtained by washing the tar with an alkaline water, or using *tinctura quillaja saponaria* in its preparation.

Tar may be *inhaled* in the form of spray by pulverising tar-water in a Seigle's spray-producer; it may also be used as a fumigation; for this purpose good ship's tar should be employed, to which 10 per cent. of carbonate of soda should be added to neutralise the pyroligneous acid contained in it, which might be irritating to the respiratory passages. At first it is best to dilute the mixture with water, so as to get at the same time the emollient action of aqueous vapour on the part affected; subsequently the amount of water may be reduced, and at last the pure tar mixture with soda may be employed; this is simply poured on to a flat dish, and heated over a spirit-lamp. The tar vapours are evolved in the vicinity of the patient for a quarter of an hour or more at a time, once or twice a day, but it is desirable that the patient should remain all day in the room the air of which has been impregnated with tar vapour.

Much that has been said with regard to tar applies also to **creasote.** It can be given in the form of capsules, and then a few tablespoonfuls of warm milk or soup should be taken beforehand to avoid gastric irritation, or one or two tablespoonfuls of the creasote

mixture of the British Pharmacopœia can be given three times a day. It can also be given in the form of pills, each containing a minim, mixed with soap and crumb of bread.

Or it may be mixed with glycerine and any agreeable tincture, with a view of covering its taste, such as the following :—

℞ Creasoti ♏xvi.
Tincturæ chloroformi compositæ } āā ʒj.
Glycerini }

Misce, fiat mistura. A teaspoonful in water or milk three or four times a day.

We have also given it mixed with cod-liver oil—2 minims of creasote with two drams of cod-liver oil—three times a day in cases of *bronchitis putrida* with remarkably good results. A mouthful or two of milk should be taken before and after the dose.

But creasote is especially useful for inhalation, and it can be very readily inhaled by means of the perforated zinc respirator already referred to (Fig. 15, p. 545).

If there is much bronchial irritation as well as profuse secretion, the sponge of this inhaler can be charged with equal parts of creasote and ether, or creasote and chloroform ; or if a less decided sedative is required, an excellent mixture for the purpose consists of equal parts of creasote and spirits of chloroform.

If it is desirable to combine the emollient effect of the vapour of water with that of creasote, the latter may be vaporised by dropping it on the surface of very hot water, and their vapours inhaled together.

The employment of turpentine, tar, and creasote is especially indicated in cases of profuse bronchial secretion (bronchorrhœa), particularly when the sputa are offensive owing to the existence of putrefactive processes in the air passages, or the presence of bronchiectatic cavities.

The inhalation of **menthol** is useful in the same class of cases; it is found to allay cough as well as to promote expectoration.

The **balsams** of **Peru** and **tolu**, **benzoin** and **storax**, are also given in chronic bronchial catarrh to modify the morbid secreting action of the respiratory mucous membrane. The well-known tincture in the B.P. contains three of these—benzoin, storax, and tolu—and is often found of great service in lessening the amount of secretion and diminishing the cough. It is necessary that this tincture should be rubbed up carefully with thick syrup or mucilage, so as to make an emulsion with the gum-resins it contains, or it will not mix with water, as:

℞ Tincturæ benzoini compositæ ʒij
Tincturæ tolutanæ ʒss.
Oxymellis scillæ ʒiij.
Mucilaginis acaciæ ʒiv.
Vini ipecacuanhæ ℥xv.
Aquæ... ad ʒvj.

Misce, fiat mistura. Two tablespoonfuls three times a day.

This tincture may also be inhaled from hot water.

Another gum-resin of value in the treatment of the chronic bronchial catarrh of old people is **ammoniacum.** It is of much value as an expectorant in certain cases. It is given rubbed up with water, as in the mistura ammoniaci of the British Pharmacopœia, or combined with squills, as in the following formula:—

℞ Tincturæ camphoræ compositæ } āāʒiij.
Oxymellis scillæ }
Misturæ ammoniaci... ad ʒvj.

Misce, fiat mistura. Two tablespoonfuls for a dose.

It is also one of the constituents of the pilula scillæ composita and the pilula ipecacuanhæ cum scillâ of the British Pharmacopœia.

Squill itself is a useful expectorant in many cases of bronchitis, especially in those cases which are intermediate between the acute and chronic forms.

It is often combined with small doses of ipecacuanha and opium, as in the *pilula ipecacuanhæ cum scillâ* of the B.P., of which 5 to 10 grains may be given at bed-time with much advantage in many cases of chronic bronchial catarrh.

Some have found a Turkish bath (taken at home) most useful in cutting short intercurrent acute or sub-acute attacks. As soon as free perspiration is induced the tightness on the chest is relieved. After the bath the patient should retire to a well-warmed bed, and some terebene should be inhaled from the oro-nasal respirator described on p. 545.*

The following formula † is a good one in those cases intermediate between the acute and chronic forms to which I have just referred :—

℞ Tincturæ scillæ ʒiv.
Tincturæ camphoræ compositæ } āā ʒiij.
Spiritus ætheris nitrosi }
Liquoris ammonii acetatis ʒjss.
Aquæ camphoræ ad ʒvj.

Misce, fiat mistura. Two tablespoonfuls every five or six hours.

In those cases in which the expectoration tends to become fœtid, cases of so-called **putrid bronchitis,** and of **bronchiectasis,** our treatment should be directed to preventing or arresting the decomposition of the bronchial secretion. Inhalations of antiseptic agents which act also as expectorants are specially indicated, such as turpentine, tar, creasote, carbolic acid, etc., after the manner already described. In such cases the inhalation of a spray of a 2 to 4 per cent. solution of carbolic acid is exceedingly useful. Inhalation of chlorine and iodine has also been recommended.

Da Costa has found *santal oil* of great value in these cases. He gives five drops three to five times a day. *Myrtol* has also been highly extolled in the treatment of putrid bronchitis. It is a volatile oil obtained from the leaves of the common myrtle; when

* *See* "Diseases of the Lungs," by Fowler and Godley, p. 109.
† Brompton Hospital Pharmacopœia.

taken internally it is eliminated chiefly by the lungs, and acts as an antiseptic and deodorant. It is given in capsules each containing 2 minims, and two of these are prescribed every two hours, and its administration is attended by a diminution of the expectoration and a disappearance of the offensive odour. Tincture of eucalyptus, turpentine, creasote, or tar may also be given internally. In these cases it is also advisable to combine tonic remedies with expectorants, so as to maintain the general strength; we should also see that the patient has a nutritious diet. The patient's apartment should be well ventilated, and the air disinfected; for this latter purpose nothing is more agreeable than oil of eucalyptus or pinol. A mixture of one part of eucalyptus oil or pinol to six parts of rectified spirit may be diffused through the air by means of a hand-spray, or by dipping cloths in it and suspending them in the room. An atmosphere so charged with eucalyptus vapour has a decidedly soothing and soporific effect, a real advantage in many cases.

The following is an excellent tonic and expectorant for such cases:—

℞ Ammonii carbonatis gr. xl.
Tincturæ nucis vomicæ ʒijss.
Tincturæ cinchonæ compositæ ʒiv.
Spiritus chloroformi ʒij.
Infusi senegæ ad ℥viij.
Misce, fiat mistura. Two tablespoonfuls three times a day.

Or, when a more decidedly bracing tonic is required, we may give this:

℞ Tincturæ ferri perchloridi ♏cl.
Liquoris strychninæ ♏xl.
Spiritus chloroformi ʒij.
Aquæ... ad ℥viij.
Misce, fiat mistura. Two tablespoonfuls three times a day.

We have already referred to the good results to be derived from the administration in these cases of cod-liver oil with creasote. Cod-liver oil is of very great

value in the emaciating forms of chronic bronchitis with profuse secretion.

In **bronchiectasis** and other cases with fœtid sputum, intra-tracheal injections of menthol (10 parts), guaiacol (2 parts), and olive oil (88 parts) have been advised. A dram of this mixture is injected twice a day into the trachea, care being taken that the nozzle of the syringe has passed beyond the vocal cords. Good results have been reported from this mode of treatment by many physicians.*

Fowler has found treatment by *creasote vapour baths* the most effectual means for preventing the decomposition of the bronchial secretion in these cases. These vapour baths are given in a small room suitably arranged for the purpose. The creasote is vaporised from a metal saucer on a tripod by means of a spirit lamp. The patient's clothes are protected by wearing a sort of smock-frock, his nostrils are plugged with cotton-wool, and his eyes also protected by goggles or a mask. The room is filled with dense clouds of vapour. The immediate effect is to cause the patient to cough violently and to expectorate profusely. At first the bath is given on alternate days for fifteen to twenty minutes; then, if well borne, daily, and the duration gradually increased to an hour or an hour and a half. A remarkable increase of appetite is said to follow the use of these baths.†

In cases of **bronchorrhœa** the indications for treatment, as we have already seen, are

1. To endeavour to prevent the formation of the muco-purulent secretion, and

2. To promote its expulsion.

Now, besides the remedies directed to these ends already referred to, there are others to which we may have recourse. Some authors advise the direct application of astringent remedies to the mucous membrane of the air-passages in the form of *sprays;* fluids

* Royal Medical and Chirurgical Society's *Transactions*, November 27th, 1894.

† "Diseases of the Lungs," by Fowler and Godley, p. 138.

pulverised by means of a Seigle's spray-producer, containing in solution such astringent substances as acetate of lead (5 grains to the ounce), tannin (5 to 10 grains to the ounce), alum (5 to 10 grains to the ounce), perchloride of iron, rhatany, etc.

These remedies have been found useful in the after-treatment of cases of bronchorrhœa and putrid bronchitis. After the fœtor of the sputa, and the decomposing processes in the bronchial tubes upon which it depends, have been arrested by antiseptic inhalations, these astringent sprays are said to be useful to remove the swelling, serous infiltration, hyperæmia, and engorgement of the bronchial mucous membrane, but it may be doubted if they pass far beyond the trachea and large bronchi.

We have already given instances of the value of senega as a stimulating expectorant in cases of chronic catarrh of the air-passages, and the following will be found a useful mixture in cases of chronic bronchial catarrh with profuse, stringy, adhesive secretion, such as is often met with in aged people:—

℞ Ammonii carbonatis } āā gr. xl.
Sodii bicarbonatis }
Tincturæ camphoræ compositæ ... ʒiv.
Spiritus chloroformi ♏clx.
Infusi senegæ ad ʒviij.

Misce, fiat mistura. Two tablespoonfuls every five or six hours, with two tablespoonfuls of hot water; the hot water materially increases its expectorant power.

The addition of 5 to 10 grains of sodium chloride to each dose of this mixture often promotes its expectorant effect.

It will be noted that this mixture contains a small quantity of opium (in the compound tincture of camphor), but it is a very small quantity, only one-eighth of a grain in a dose, for it is necessary to be very cautious in the use of opiates in such cases. As we have already said, they are often extremely badly borne by old people, for, by diminishing the sensibility of the bronchial mucous membrane,

the efforts of coughing are diminished, and the patient may fall asleep, never to wake again; for in this sleep the mucus accumulates in the air-passages, the access of air to the air-cells is more and more interfered with, carbonic acid accumulates in the blood, and the patient dies poisoned by it. It is essential always to bear this in mind in treating the coughs of aged persons.

It is well also to remember the value of an occasional **emetic** in those cases of chronic bronchial catarrh with profuse suffocative secretion. The mechanical compression which the lungs undergo in the act of vomiting not only tends to the expulsion of the mucus accumulated and retained in the air-passages, but it also relieves pulmonary engorgement by simultaneous compression of the blood-vessels.

Gerhardt has strongly recommended the application of **manual compression** to the chest and abdomen in cases where it is difficult by ordinary means to procure free expectoration and unloading of the air-passages of the morbid secretions accumulated in them. He maintains that manual pressure on the external surface of the thorax and abdomen, applied during expiration, leads to the following good results:—

1. Elevation of the diaphragm and a consequent reduction of the pulmonary dilatation.
2. Increase of vital capacity.
3. Diminution of the frequency of respiration.
4. Promotion of expectoration.

Cases in which the air-passages are occluded by viscid secretions, which the feeble muscular power of the patient is unequal to expel, are specially suitable for this mechanical treatment. The expiratory effort is directly strengthened by the associated manual pressure from without, and expectoration is also, indirectly, promoted by the more vigorous muscular activity resulting from increased supply of oxygen. Gerhardt mentions the case of a patient with large

bronchiectatic cavities in the lower lobe of the left lung, in which by inhalations of turpentine he soon succeeded in removing the odour of the sputa, but the expectoration was small, and physical examination showed that the cavities remained for several days together constantly filled. He then endeavoured to promote and increase the expiratory effort mechanically by placing the patient on his right side, and daily employing manual pressure, by which means he succeeded in preventing the retention of the sputa.

Stokes estimated highly the effect of **counter-irritation** and revulsive treatment in chronic bronchial catarrh, and our own experience confirms his view. Stokes used to order a large portion of the chest to be sponged daily with a liniment composed of spirit of turpentine and acetic acid, so as to *keep up* an erythematous state of the skin. He thought that, besides the counter-irritation thus produced, some of the ingredients were absorbed by the surface.

No doubt the vapour of the more volatile constituent (turpentine) may be inhaled, and thus act locally on the bronchial mucous membrane. Patients themselves learn the value of these embrocations, and ask that they may be renewed. The linimentum terebinthinæ of the B.P. is a useful form, to which may be added, in the cases of scrofulous children, a dram or two of tincture of iodine to the ounce. The linimentum terebinthinæ aceticum (B.P.) is also very valuable; it contains oil of turpentine, acetic acid, and camphor.

The linimentum crotonis is likewise useful, as a revulsive, in some obstinate cases of chronic bronchial catarrh; the disadvantage attending its use is that it brings out an unsightly eruption of the skin, which may be avoided by diluting with twice its bulk of linimentum saponis.

The following is the formula for Stokes's embrocation :—

℞ Spiritus terebinthinæ ʒiij.
Acidi acetici ʒss.
Vitelli ovi ʒj.
Olei limonis ɜj.
Aquæ rosæ ʒvj.
Misce, fiat linimentum.

We must now consider, briefly, the value of **alterations of atmospheric pressure** in the treatment of chronic bronchial catarrh. This "pneumatic" method of treating chronic catarrh of the air-passages is more common in other European countries than in England, and most of the large cities and many health resorts on the Continent possess "pneumatic institutions" for the treatment of pulmonary affections by alterations of atmospheric pressure.

Various portable apparatus for this purpose,* notably one devised by Waldenberg and another by Schnitzler, are also in use in Germany and Russia.

The "Pneumatic Chamber,"* in which the patient remains for some time, is chiefly employed for inspiration of compressed air; but by means of suitable arrangements he can be made to *inspire* compressed air and *expire* into rarified air. So, also, by means of the portable apparatus mentioned, he can either *inspire* compressed or rarefied air, or *inspire* the former and expire into the latter.

The compressed air can also be made, by a slight addition to the apparatus, to flow through solutions of tar, creasote, eucalyptol, pinol, etc., and so become impregnated with vapours having a specific action on the bronchial mucous membrane.

It has been found that chronic bronchial catarrhs, even when obstinate and of long standing, are favourably influenced by pneumatic treatment. The pressure which compressed air exerts upon the swollen and hyperæmic respiratory mucous membrane lessens the calibre of its vessels and reduces the afflux of blood, while it promotes the efflux of blood and the fluids of the tissues, and in this way diminishes the swelling.

* These are fully described in the author's translation of Oertel's "Respiratory Therapeutics."

This diminution of the flow of blood to the mucous membrane and promotion of the efflux of fluids from it lessens the amount of secretion and widens the lumen of the tubes, giving freer passage to the in-flowing air, and thus increases the amount of air that can enter and leave the air-cells, and greatly aids pulmonary ventilation.

If there is but little secretion in the bronchi, and expectoration is difficult, while the tubes remain permeable to compressed air, then this air of higher tension rushes into the partially collapsed air-cells beyond the tubes, and thus imparts increased expulsive power, and facilitates expectoration.

Expectoration is also promoted by expiration into rarefied air, as by a simple physical process it removes hindrances to the outflow of air from the air-passages. It is not needful here to enter more fully into the theory of pneumatic treatment, but those who have had the largest opportunities of watching its results maintain that its beneficial effect in the majority of cases of chronic bronchial catarrh is permanent, that the catarrh is often entirely cured, and, even in incurable cases, dependent on some more deeply seated pulmonary lesion or cardiac affection, it is greatly alleviated.

At Reichenhall, near Salzburg, a very complete establishment exists for the treatment of respiratory affections in the Pneumatic Chamber.

The influence of **climate** in the alleviation, as well as in the causation, of chronic bronchial catarrh, is universally known.

Those who suffer habitually from bronchial catarrh in the winter should, if possible, pass that part of the year in a climate where they may be exposed as little as possible to sudden changes of temperature, to chilling fog and mist, and to cold winds, and where they can get, without danger, a certain amount of exercise in the open air with plenty of sunshine.

The choice of any particular place is often determined by considerations of convenience, expense, or

society. In England the best wintering-places for most cases of chronic bronchial catarrh are Torquay, Falmouth, Tenby, Penzance, Bournemouth, the Undercliff in the Isle of Wight, and St. Leonards.

But a drier and warmer winter climate than can be obtained in England is advisable in many cases, and for these we can choose from the various resorts on the Western Riviera, one of the best of which is Mentone; or, if we consider the climate of the Riviera too exciting, we may select Algiers or Tangier, Oratava, or Las Palmas; or, if we wish a very dry climate, there is the desert climate in Egypt.

Madeira, Huelva, Malaga, Ajaccio, Palermo, Corfu, and many other places offer also suitable winter quarters for the catarrhal subject. Perhaps the best for the majority of patients is Madeira, which is now accessible by the fast Cape steamers in three or four days.

Some German physicians prefer the more bracing but dry and sunny climate of Meran and Arco for their catarrhal patients in winter. At Meran treatment in the Pneumatic Chamber can be obtained, and in the appropriate seasons the grape or milk or whey cures can be had.

A course of **mineral waters** is often prescribed with advantage for sufferers from chronic catarrhal affections of the air-passages.

In France it is very common for such patients to be sent during the summer months to a sulphur * spa in the Pyrenees.

The French physicians are fond of dividing their catarrhal cases into three classes—the scrofulous, the arthritic (or rheumatic and gouty), and the dartrous. By the "dartrous" they mean constitutions prone to cutaneous eruptions. This classification has always appeared to us somewhat artificial, but

* Sulphur in 5- to 10-grain doses three times a day was recommended by Graves in the treatment of severe chronic bronchitis with abundant expectoration. He maintained that it lessened the amount of secretion and facilitated its expulsion.

they found upon it indications for the application of their different mineral springs to individual cases.

The arthritic or gouty cases are sent to Eaux Bonnes, Cauterets, or St. Sauveur in the Pyrenees, or to St. Honoré in the Department of Nièvre; if the catarrh is irritative and congestive, to Mont Dore, La Bourboule, or Plombières. The scrofulous are sent to Barèges in the Pyrenees, to Aix in Savoy, or the adjacent Challes, or to Uriage. The "dartrous" or "herpetic" are sent to La Bourboule or Royat.

The German physicians, on the other hand, consider those mineral springs which contain chloride of sodium in small quantity, or, still better, chloride of sodium combined with carbonate of soda, and containing some free carbonic acid, as specially suitable to the treatment of chronic catarrh of the air-passages.

Ems is pre-eminently the spa for this purpose, as it contains both chloride of sodium and carbonate of soda in small quantity. *Neuenahr* has somewhat similar properties. *Soden*, near Homburg, is also the type of a weak chloride of sodium-water, containing free carbonic acid, and it deservedly enjoys a great reputation in Germany for these cases.

Reichenhall offers salt springs, and "*salines*" where patients can promenade and inhale the emanations from the "graduation houses," as well as facilities for pneumatic treatment.

Weissenberg, near Thun, in Switzerland, with a hot sulphate of lime spring, and a moderate elevation, is considered by the Swiss physicians an excellent summer resort for sufferers from chronic catarrh of the air-passages.

When chronic bronchial catarrh occurs in obese middle-aged people who are free livers, a course of some more active mineral spring is indicated, and such patients derive advantage from a few weeks' treatment at Kissingen, Marienbad, or Carlsbad.

In all these health resorts the various kinds of baths available enable the physician to submit his patient, if he wishes, to those "repeated energetic

sweatings" of which Niemeyer speaks so highly, powerful revulsion to the skin being undoubtedly an efficient means of relieving bronchial congestion.

After one of these courses, which, it must be remembered, are only taken in the warm season, it is usually advisable to spend two or three weeks in some moderately elevated, bracing mountain resort, and amongst *pine*-forests, such as may be found in the Black Forest, or in Switzerland.

If, as has already been said, the bronchial catarrh is associated with the existence of some other disease or constitutional state, we must not lose sight in our therapeutic efforts of the original disorder.

In the case of *scrofulous* children, we must look carefully to the general nutrition, give cod-liver oil, enjoin residence at the seaside, the use of salt-water baths, free exercise in the open air in suitable weather, and mix some iodine with our embrocations.

In these cases the syrup of the iodide of iron is very useful, and it may be combined with cod-liver oil. *Hypophosphite of lime* is also often of remarkable value in treating the chronic bronchial catarrh of children and young people.

In the gouty, as we have already pointed out, alkaline waters, saline purgatives, potassium iodide, and ammonium chloride are the best remedies, a few doses of colchicum being occasionally required. Opiates are to be avoided.

In cases associated with a tendency to cutaneous eruptions, arsenic will be useful.

If there is a well-marked syphilitic taint, we should of course employ iodide of potassium.

When chronic bronchial catarrh is a complication of heart disease, it will often be necessary to enjoin strict repose in a warm but well-ventilated apartment; we must also give supporting food and medicines, and some form of alcoholic stimulant is of great value. In many cases of mitral regurgitation, digitalis will be helpful, and in feeble anæmic cases it may be combined with iron.

It is especially necessary in these cases to obtain free and regular evacuations from the bowels, for by unloading the intestines the descent of the diaphragm is facilitated, and any derivation of fluid from the portal venous system tends, indirectly, to relieve the engorgement of the right side of the heart.

A very useful form of aperient for such patients, which is efficacious without being depressing, is a pill of 2 or 3 grains of watery extract of aloes, and ½ or ¾ of a grain of ipecacuanha powder at bed-time, followed the next morning by 1 or 2 teaspoonfuls of Carlsbad salts in a tumblerful of hot water.

ADDITIONAL FORMULÆ.

Mixture for chronic bronchitis with emphysema.

℞ Ammonii carbonatis, gr. xl.
Tincturæ nucis vomicæ, ♏cc.
Tincturæ scillæ, ʒj.
Infusi serpentariæ ad ʒviij.
M. f. mist. Two tablespoonfuls for a dose. (Digitalis should be added when there is dilatation of right side of heart.)
(*Fothergill.*)

"Routine" mixture for chronic bronchitis.

℞ Ammonii carbonatis, gr. xxiv.
Tincturæ scillæ, ʒiv.
Tincturæ camphoræ compositæ, ʒij.
Infusi senegæ ad ʒviij.
M. f. mist. Two tablespoonfuls for a dose. (*Iodide of potassium* is added if expectoration is difficult; *lobelia* if there is much dyspnœa.) (*Suckling.*)

Expectorant mixture in chronic bronchitis of old people.

℞ Ammonii chloridi, ʒj.
Tincturæ camphoræ compositæ, ʒj.
Misturæ ammoniaci ad ʒxx.
M. f. mist. A tablespoonful four times a day in water.
(*Whitla.*)

Potassium citrate syrup as an expectorant in chronic bronchitis.

℞ Potassii citratis, ʒj.
Succus limonis, ʒjss.
Syrupi ipecacuanhæ, ʒss.
Tincturæ camphoræ compositæ, ʒiij.
Syrupi, ʒiij.
M. f. syrup. A dessertspoonful every two hours.
(*Thérap. Gaz.*)

Creasote pills for chronic bronchial catarrh.

℞ Creasoti, ♏xij.
Pulveris saponis, gr. xv.
Micæ panis, ʒss.
M. et divide in pil. xij. One or two three times a day.
(*Whitla.*)

Inhalation for bronchorrhœa and bronchitis fœtida.

℞ Acidi carbolici, ʒss.
Tincturæ opii camphoratæ, ʒiij.
M. A teaspoonful to be inhaled freely from half a pint of hot water. (*Prof. Davis.*)

Inhalation for bronchorrhœa.

℞ Acidi carbolici, ♏viij.
Olei pini pumilionis, ♏xx.
Aquæ ad ℥j.
M. To be diffused from the surface of water kept boiling.
(*Dr. R. Lee.*)

Antiseptic inhalation for fœtid bronchitis.

℞ Thymol, ʒj.
Acidi carbolici, ʒij.
Creasoti, ʒij.
Spiritus chloroformi, ℥j.
M. f. inhal. (*Whitla.*)

Pills for chronic bronchitis.

℞ Pulveris senegæ, ʒj.
Pulveris ipecacuanhæ, gr. vijss.
Olei terebinthinæ, ʒj.
Pulveris althææ, q.s.
Mucilaginis acaciæ, q.s.
M. f. pil. l. (To be kept in orris powder.) One three or four times a day. (*Bamberger.*)

Pills for chronic bronchial catarrh.

Pulv. ammoniaci, gr. xlviii.
Pulv. scillæ, gr. xxiv.
Pulv. ipecac. comp., gr. xxxvi.
Syrupi simp., q.s.
M. et divide in pil. xxiv. Two every four or five hours.

Mixture for chronic bronchitis and bronchorrhœa.

℞ Extracti eucalypti fluidi, ʒj.
Ammonii chloridi, ʒij.
Extracti glycyrrhizæ, ʒij.
Glycerini, ʒiij.
M. A teaspoonful (in water) four to six times a day.
(*Bartholow.*)

An expectorant in bronchial catarrh.

℞ Tincturæ sanguinariæ, ʒj.
Tincturæ lobeliæ, ʒj.
Vini ipecacuanhæ, ʒj.
Syrupi tolutani, ℥ss.
M. A teaspoonful every three hours. (*Bartholow.*)

Mixture for Bronchorrhœa.

℞ Balsami copaibæ, ʒijss.
Pulveris gummi acaciæ, ʒijss.
Syrupi menthæ, ʒv.
Aquæ menthæ ad ℥vj.
M. f. mist. Two tablespoonfuls night and morning.
(*Bamberger.*)

Mixture for "dry" chronic bronchial catarrh.

℞ Potassii iodidi, ʒss.
Potassii bicarbonatis, ℥ss.
Ammonii chloridi, ʒij.
Liquoris morphinæ hydrochloridi, ʒj.
Aquæ chloroformi ad ℥viij.
M. f. mist. A tablespoonful every four or six hours, or a teaspoonful every two hours.
(*Whitla.*)

Terpene mixture for chronic bronchial catarrh with profuse secretion.

℞ Terpene, gr. vijss.
Alcohol, ʒv.
Syrupi catechu, ℥j.
Aquæ ad ℥iv.
M. f. mist. A tablespoonful every three hours.
(*Dujardin-Beaumetz.*)

Mixture for rheumatic bronchitis.

℞ Sodii salicylatis, ʒvj.
Glycerini, ℥ss.
Vini colchici radicis, ʒvj.
Syrupi scillæ compositæ, ℥jss.
Tincturæ opii camphoratæ, ℥ij.
M. f. mist. A teaspoonful in a little water every three or four hours.
(*Prof. Davis, M.D., Chicago.*)

Compound tar pills for chronic bronchial catarrh.

℞ Picis, gr. xviij.
Pulveris benzoini, gr. xviij.
Pulveris ipecacuanhæ compositæ, gr. ix.
M. f. pil. xij. One or two three times a day.
(*N. Guéneau de Mussy.*)

Terpinol pills for chronic bronchial catarrh.

℞ Terpinol, gr. jss.
Sodii benzoatis, gr. jss.
Syrupi, q.s.
Ut f. pil. Three or four of these pills are given three times a day. (*Dujardin-Beaumetz.*)

Terpine pills.

℞ Terpine, gr. xxx.
Sacchari albi, q.s.
Acaciæ gummi, q.s.
Ut f. pil xx. One thrice daily, immediately after food.
(*Wyss.*)

Linctus for irritative cough.

℞ Succi limonis, ʒij.
Mucilaginis acaciæ.
Syrupi simplicis, āā, ʒv.
Aquæ chloroformi, ʒiv.
M. f. linctus. One or two teaspoonfuls occasionally.

Cough syrup for bronchial or laryngeal catarrh.

℞ Antimonii tartarati, gr. j.
Ammonii chloridi, gr. lxxx.
Extracti glycyrrhizæ, gr. xx.
Morphinæ hydrochloridi, gr. j.
Syrupi tolutani.
Aquæ laurocerasi āā ʒj.

M. f. syrup. A teaspoonful every two, three or four hours. This should not be prescribed for *old* people on account of the morphine it contains, or only with great caution.

Simple expectorant mixture.

℞ Tincturæ benzoini comp., ʒij
Syrupi tolutani, ʒiij.
Misturæ amygdalæ, ad ʒvj.

M. f. mist. Two tablespoonfuls for a dose.

CHAPTER IV.

THE TREATMENT OF ASTHMA (SPASMODIC ASTHMA, BRONCHIAL ASTHMA), HAY FEVER AND EMPHYSEMA.

The Essential Nature of an Asthmatic Paroxysm—Two Forms, the *Spasmodic* and the *Catarrhal*—Therapeutic Observations throw Light on its Pathology—Description of the Paroxysm—Auscultatory Signs—Asthma a Respiratory Neurosis. *Treatment* of the *Paroxysm*—Morphine—Atropine—Chloroform—Ether—Nitrite of Amyl—Iodide of Ethyl—Pyridine—Chloral Hydrate—Fumigation—Cigarettes—Tobacco—Nitre Papers—Stramonium—Datura tatula—Cigarettes d'Espic—"Carton Fumigatoire"—Himrod's and other Cures—Arsenical Cigarettes—Coffee and Caffeine—Ice—Ammonia Vapour—Emetics—Potassium Iodide—Belladonna—Lobelia—Euphorbia Pilulifera—Grindelia—Conium—Hyoscine—The Bromides—Strychnine—Arsenic—Adrenal Substance—Dependence of Asthma occasionally on Naso-pharyngeal Disease—Electricity—Pneumatic Treatment—Inhalations of Oxygen—The Mont Dore Cure—The correct Pathology deducible from Therapeutic Observations—Prof. Fraser's Observations on the Action of the Nitrites—Climatic, Dietetic, and Hygienic Management.

Hay Fever, or *Hay Asthma:* Two forms, the *Catarrhal* and the *Asthmatic*—Causes—Symptoms—Indications for Treatment—Change of Climate—Oily Sprays—Antiseptic Lotions, etc.—Cocaine—Atropine and Morphine—Inhalations—*Suprarenal Extract*—Operative Measures—Constitutional Treatment.

Emphysema: Causes—Indications for Treatment—Pneumatic Treatment—Additional Formulæ.

ASTHMA.

THE essential condition of an attack of **asthma** is the existence of a state of spasmodic contraction of the bronchial muscles—of those unstriped muscular fibres that have long been known to enter into the structure of the walls of the bronchial tubes, and to extend even to their finest ramifications. *Spasm* of these muscular fibres is the *essential* element in the asthmatic attack. In a case of purely *spasmodic* asthma, of the ordinary transitory character, this condition of bronchial spasm is a complete and simple explanation of the phenomena

of the asthmatic paroxysm. But asthma is not always such a simple matter. In what is termed "*bronchial* asthma" the asthmatic attack is associated with *bronchial catarrh*, and the catarrhal condition seems frequently to bear a causative relation to the asthmatic paroxysm, as well as to intensify it and to render it less transitory and more continuous.

Clinically, then, we have to deal with two forms of asthma, the one *simply spasmodic*, the other spasmodic *also*, as its essential element is spasm, but *complex* also, as there is co-existent bronchial catarrh.

We have stated the case thus simply at the outset for the sake of clearness. These statements, however, have been the subject of much controversy—a controversy which we shall not be able altogether to avoid. The treatment of asthma is a remarkable illustration of the fact that a therapeutic observation is often an experiment in practical pathology, and is calculated, in some obscure morbid conditions, to throw great light on their true nature and causation. In such instances, the pathology of the morbid state under consideration can be more clearly and fully examined *after* we have considered the manner in which its phenomena are influenced by the introduction of those modifying agencies which we sum up in the word "treatment."

A severe paroxysm of spasmodic asthma may be thus described:—

Suddenly, without any warning, often in the middle of the night, or between two and four in the morning, the subject of asthma wakes up with an attack of urgent dyspnœa upon him. In some cases premonitory signs are noticed, which vary greatly in character. Some complain of flatulent dyspepsia as a forerunner of the attack; others of languor, headache, depression, and sleepiness; others of unusually high spirits; and many notice a tendency to pass large quantities of pale urine of low specific gravity, as in hysteria and other emotional nervous states. Some complain of slight cough, and a feeling of irritation

about the upper air-passages, and a slight sense of constriction in the chest before the onset of the paroxysm.

The dyspnœa usually increases rapidly in intensity, and we find our patient sitting up in bed with arms fixed, shoulders raised, and head thrown back on the pillows, which are piled up behind him to support him in this position; we find him gasping for breath, taking short, forced inspirations, followed by relatively prolonged, noisy, wheezing expirations.

He is unable to move, or even sometimes to articulate a single word. The extremities are cold, owing to the interference with the circulation which this pulmonary spasm presents, while the face is often covered with beads of perspiration.

If the attack occurs in the daytime, the patient will remain riveted in his chair in this same attitude, with his arms fixed and rigid, until the violence of the paroxysm subsides; or you may find him in the erect attitude, grasping some convenient support.

The countenance is sometimes pale and anxious, sometimes flushed and congested, sometimes dusky and livid.

The chest is usually distended and hyper-resonant on percussion, and the diaphragm is depressed. There is plenty of air in the lungs—too much, indeed—but it cannot get out and be renewed! On auscultation peculiar prolonged cooing, or whistling, or wheezing sounds may be heard, with varying intensity, at over the chest, especially during expiration.

If the attack is associated with the existence of bronchial catarrh, sonorous, sibilant, and crepitating *râles* will also be heard on auscultation.

As the attack comes to an end there is usually, *but not invariably*, a small amount of characteristic expectoration consisting of small, transparent, pearly pellets the size of a pea, or smaller.

What is the nature of this remarkable paroxysm?

We regard asthma as a *respiratory neurosis*, and the asthmatic seizure as essentially a disturbance of

respiratory innervation, what Trousseau called an "*epilepsy of the lungs.*"

That the attack may be dependent on the development or retention of some toxin in the blood, the outcome of disturbed metabolism as maintained by some writers, is probable enough.*

Those who admit the essentially nervous spasmodic nature of the asthmatic paroxysm are not all agreed as to the precise extent of muscular area over which the spasm extends. For some it is a spasm of the diaphragm chiefly—the diaphragm, it is said, is rigidly and convulsively fixed in its extreme inspiratory position; for others it is a spasm of all the inspiratory muscles—the diaphragm, the intercostals, scaleni, trapezii, and all the muscles that take part in inspiration; for others the spasm is limited to the *bronchial* muscles, the involuntary muscles that are found in the smaller bronchial tubes, and for them the asthmatic paroxysm consists in a spasmodic contraction of these muscles, diminishing the calibre of the smaller air-tubes, and resisting alike both the ingress and egress of air; finally, there are others who think that both these sets of muscles are affected, the bronchial muscles *within* as well as the inspiratory muscles without the lungs.

Such an attack as we have described, if unrelieved by any remedy, may last, with some variations in its severity, from two to six hours; the patient may then fall asleep, and awake perfectly well; or there may remain a slight tendency to wheezy and difficult respiration for a day or two.

Sometimes, however, the paroxysms will recur, with longer or shorter incomplete remissions, for four or five days (or nights), and then the attack will pass away and the normal state of health be re-established, and months, or even years, may elapse without any return.

* This view is fully developed in an able paper by Dr. Adam of Hamilton, on "The Nature and Treatment of Asthma."—Glasgow Hospital *Reports*, 1901.

During these intervals there may be no discernible evidence of the existence of any disease of the chest, unless the attacks have been numerous, and have recurred within comparatively short periods of time during many years; then, as you may suppose, these continued, repeated, and violent disturbances of the respiratory function lead to permanent injury and disease of the thoracic viscera; pulmonary emphysema and chronic bronchial catarrh become established, there is more or less constant dyspnœa on any exertion, and as age advances the right side of the heart dilates, and finally embarrassment of the circulation with tricuspid insufficiency and dropsy may lead to a fatal issue. But these latter conditions are the *consequences* of asthma—they are not asthma—the disease with which we are now concerned.

Sufferers from asthma, however, do not all have attacks of the severity of the one described; attacks of minor severity are very common. The duration also of the severe attacks, in certain very bad cases, is much longer, and may continue with little intermission for many weeks.

Asthma then, we repeat, is a *respiratory neurosis* attended with spasm of the bronchial muscles, preventing both the ingress and egress of air in respiration. In some cases it is associated with bronchial catarrh, in others it is not.

With these few preliminary observations we are now in a position to enter on the consideration of the **treatment of asthma.**

And first, with regard to the treatment of the asthmatic paroxysm when it is established.

We know of no remedy so generally efficacious in cutting short a *severe* fit of asthma as **morphine** administered hypodermically, and we are accustomed to add a small dose of atropine to the morphine. We give from $\frac{1}{6}$th to $\frac{1}{3}$rd of a grain of the acetate or hydrochloride of morphine, with $\frac{1}{120}$th or $\frac{1}{60}$th of a grain of the sulphate of atropine. A hypodermic

injection of this kind will often subdue the most severe paroxysm of spasmodic asthma in a few minutes.

It is a remedy, however, which has to be used with great discretion, and which should be strictly reserved for the very severe paroxysms. It has this drawback, that it is not safe to leave it in the hands of the patient or his friends. It must be reserved for administration by the physician himself. Sooner or later, however, the patient acquires for himself the knowledge of the relief which an injection of morphine brings, and then he learns to apply it to himself, and in this way the morphine habit becomes occasionally established.

It should *never* be employed in the bronchitic asthma of aged people, or whenever there are signs of co-existing profuse bronchial catarrh, unless the suffering from dyspnœa is extreme and other remedies have failed to give relief; and in that case only a small dose should be given, and its effect carefully watched.

The late Dr. W. E. Steavenson, of St. Bartholomew's Hospital, himself a sufferer from spasmodic asthma, in a valuable thesis written by him on this subject, speaking of suitable remedies for the paroxysm, observes:

"Above all in value I should place the hypodermic injection of morphia. This has never failed to relieve an attack in myself, and I have never seen it fail in other patients.

"The objection to it is that, if often used, the dose must be increased; but it is better to increase the dose of morphia than suffer the agonies of asthma.

"I have now used morphia for five years, but my attacks are so quickly relieved, and so reduced in frequency, that I have never had yet to increase the dose I commenced with, namely, $\frac{1}{6}$th of a grain."

The *inhalation* of **chloroform** is a favourite remedy with some to relieve the asthmatic paroxysm, and it is undoubtedly a valuable resource in many

cases; but there are patients who have a great dread of inhaling chloroform, and its use should be reserved for those cases where there may be good reasons for avoiding the employment of morphine, and, when given, it should not be pushed to complete insensibility. Dr. Steavenson's personal experience was that it "never failed to subdue a paroxysm, but that its effects were as evanescent as the drug."

Steavenson found **ether** in the form of Hoffman's anodyne often give temporary relief, and so would also chlorodyne.

The inhalation of **nitrite of amyl,** 3 to 5 minims (best in capsules), also gives temporary relief; but its effect is evanescent, and in severe cases the improvement does not last more than ten or twelve minutes, when the dyspnœa gradually returns. The effect of nitro-glycerine also passes away quickly, but that of sodium nitrite is more lasting.

Attacks of paroxysmal dyspnœa which occasionally come on in advanced stages of renal disease—the so-called cases of uræmic or renal asthma—are best treated by inhalations of chloroform or nitrite of amyl, and must *on no account whatever be treated by opiates.* If you give opiates in any form in these cases, you may relieve the dyspnœic paroxysm, but it may be at the expense of your patient's life!

The inhalation of **iodide of ethyl**—10 to 15 minims or more on a piece of lint, held in the palm of the hand—has been strongly advocated for the relief of the asthmatic paroxysm, and we have found it useful in many cases of not great severity, and in cases associated with bronchial catarrh. Martindale's capsules of chloroform (10 minims) and iodide of ethyl (5 minims) may be used.

The inhalation of **pyridine** has been used to relieve the asthmatic paroxysm. In young children it may be dropped (5 to 10 minims) on a handkerchief tied round the neck, and for adults a teaspoonful may be placed in a heated saucer, and inhaled three times a day, or it may be simply placed near the patient.

It is said to lessen the sensibility of the vagus, and to diminish the excitability of the medulla. It quickly appears, after inhalation, in the urine. Its unpleasant nauseating odour is a very great drawback to its use.

Chloral hydrate is another remedy in great favour with some physicians. It must be given in a full dose—30 to 40 grains—and its administration is frequently followed by partial, if not complete, subsidence of the paroxysm.

It does not, however, agree with some patients. Dr. Steavenson, for instance, says, "Instead of relieving me, it added to my already unhappy condition by inducing delirium!"

In many instances the paroxysms of asthma, especially the less severe cases, can be arrested, or favourably modified, or more or less kept under, by **fumigations** of various kinds.

When the paroxysm is not so severe as to disable the patient from smoking, a convenient mode of inhaling the fumes of the remedies employed is by smoking cigarettes composed of or impregnated with these drugs. If the patient is unable to smoke, these remedies may be burnt close to him, and their fumes diffused through the air of his apartment.

Simply smoking *tobacco*, to those unaccustomed to its use, will occasionally subdue an attack; but its use is attended by the well-known nausea and faintness experienced by beginners in the use of the weed. Inhaling the fumes of **nitre paper**, *i.e.* paper which has been soaked in a strong or saturated solution of potassic nitrate, is a popular as well as very efficacious remedy in many cases. Paper so charged may be rolled up in the form of cigarettes and smoked; or it may be freely burnt in the patient's apartment. It is especially in the purely spasmodic form that these fumes are most useful. In most cases it is necessary to burn this paper very freely so that the room may become filled with a dense cloud of these fumes.

Many persons who are subject to attacks of

asthma keep nitre paper at hand in their bedrooms, and begin burning it on the first warning of the approach of an attack.

Most of the medicated cigarettes and powders which are sold for the relief of asthma contain **stramonium** or *belladonna*, or both; the former is a drug which has long maintained, and justly so, a very high position as a remedy for asthma.

Some of these cigarettes contain opium also. The *Datura tatula*, a plant closely allied to the *Datura stramonium*, is the basis of others of these remedies.

The celebrated *Cigarettes d'Espic* are said to be made of the following ingredients:—

Belladonna leaves	5½ parts.
Hyoscyamus leaves	2¾ ,,
Stramonium leaves	2¾ ,,
Phellandrium aquaticum	1 part.
Extract of opium	⅛ ,,
Cherry-laurel water	a sufficiency.

The dried leaves, stripped of their stems, are cut small, well mixed, and then moistened with the opium dissolved in the cherry-laurel water. The paper used for making the cigarettes is also soaked in an infusion of these leaves in cherry-laurel water. Usually in making these cigarettes a little nitrate of potash is added to the infusion to make them burn freely.

The fumes of stramonium at once relieve certain asthmatics, but they fail to do so with others—especially, it is said, with those who use tobacco habitually.

Some of the fuming-papers that are sold for the relief of asthma contain potassium iodide, and others potassic chlorate, as well as potassic nitrate.

The "*Carton fumigatoire*" of the French Codex is a very useful preparation. It contains nitre combined with powdered belladonna, stramonium, digitalis and lobelia leaves, and myrrh and oliban. Pieces are burnt in the patient's room.

Some of the powders sold as patent medicines, and now largely employed by asthmatics, are often very useful in relieving the dyspnœa, but they are

used much too freely, and are apt to produce a seriously depressing effect on the heart.

This may certainly be said of "Himrod's Cure for Asthma" and of "Senier's green powder."

It has been stated that Himrod's cure does not contain stramonium; it certainly contains a drug which causes dilatation of the pupils. It has also been stated that the following is a good imitation of it:—

℞ Lobelia, powdered
Black tea, powdered } each 1 oz.
Stramonium leaves, powdered

Pour upon this mixture 2 oz. of a saturated solution of nitrate of potash, mix thoroughly, and dry.*

The fumes of *arsenical* cigarettes prove of great service to many asthmatics. They are usually made by dissolving 15 grains of arsenite of potash in half an ounce of distilled water, and saturating unsized paper with it. This is afterwards dried and cut up into twenty pieces, each of which is rolled up into a cigarette. The smoke from the cigarette must be drawn into the bronchial tubes by a slow inspiration.

Strong *coffee* is a popular and good remedy for the relief of asthma; it should, however, be taken on an empty stomach, for it is necessary that it should be very strong, and the tannin it contains, if taken on a full stomach (as Dr. Steavenson has pointed out), precipitates the peptones, and thus disturbs digestion, and may become another exciting cause of dyspnœa.

But instead of coffee, **caffeine**, or the **citrate of caffeine**, is now extensively used in the treatment of paroxysmal neuroses, and we have found it of undoubted efficacy in the treatment of asthma, especially in preventing the attacks or in diminishing their severity. Two or three grains should be given with a little sugar of milk in a powder about an hour before bed-time, and again during the night if

* Other formulæ will be found at the end of the chapter.

necessary; or it may be taken as a precautionary measure an hour before lunch or dinner.

It may also be given hypodermically made into a solution with sodium benzoate.

The *vapour of ammonia* is advantageous to some asthmatics, and cases are on record of persons, prone to these attacks, who have found an immunity from them when constantly exposed to an atmosphere containing ammonia, as in the air of stables.

The use of **emetics** for the relief of the asthmatic attack has been highly commended by some, and we have seen very great benefit follow the unexpected emetic action of a hypodermic injection of morphine; but in such cases there is usually a co-existing bronchial catarrh, and the emetic effect is attended with the discharge of much stringy, tenacious mucus from the bronchi.

In asthmatic *children* an emetic of 20 grains of ipecacuanha will sometimes be of use by emptying an overloaded stomach, as well as by expelling catarrhal secretion from the air-passages.

In certain phases which asthmatics will sometimes present—such especially as the occurrence of almost continuous dyspnœa, with signs of *dry catarrh*, *i.e.* a good deal of irritating, hacking cough, and very little expectoration—we have found great benefit from the administration of small, nauseating doses of *tartar emetic*, together with small doses of morphia and potassium iodide.

The following we have found a useful prescription in such conditions:—

℞ Antimonii tartarati gr. j.
Liquoris morphinæ hydrochloridi... ... ʒij.
Potassii iodidi gr. xl.
Spiritus chloroformi ʒij.
Aquæ ad ʒiv.

Misce, fiat mistura. One tablespoonful, with one of hot water, every three or four hours until relieved.

Steavenson observed in his own case that the relief afforded by emetics *preceded* vomiting: "when

the first sense of nausea and faintness is experienced the relief is immediate;" and he argued that that proved "conclusively the nervous character of asthma;" the emetic acted through its power of relieving muscular spasm.

Iodide of potassium is one of the most reliable of remedies for asthma, both during the paroxysms and in the intervals. It may be given in 5- to 15-grain doses twice or three times a day, and one of these doses should be given at bed-time. In old cases of bronchitic asthma it is a good plan to give a small dose of the extract of stramonium with the iodide of potassium. The following is a very good formula:—

℞ Potassii iodidi gr. v ad xv.
Extracti stramonii gr. ½ ad ¼.
Spiritus chloroformi ♏xx.
Spiritus ammonii aromatici ♏xx.
Aquæ ad ℥jss.
Misce, fiat haustus.

This draught may be taken at bed-time only, or it may be taken more frequently, according to the requirements of the case. The extract of stramonium is, however, often found a very uncertain drug. Different extracts seem to be of very unequal activity.

When the extract is good it usually gives rise, at first, to some unpleasant dryness of the throat and mouth, some disturbance of vision, and sometimes a little headache and loss of appetite. These effects worry some patients excessively, and they will often refuse to continue its use.

It is for these reasons that it is best to give the stramonium at night only, when its unpleasant effects can be to a great extent slept off!

Belladonna, when given alone, is not nearly so useful a remedy for asthma as stramonium. It is, however, commended in large doses (½ dram of the tincture) by some authors. It causes a most distressing sense of dryness in the throat, besides unpleasant disturbances of vision in many. *Combined* with other drugs it enters into the composition of many remedies

for asthma, and we have already pointed out how useful its alkaloid atropine proves when combined with morphine.

Some patients cannot take potassium iodide without suffering from lachrymation, frontal headache, and other signs of coryza; and in some it causes intense depression. In such cases you may give the *bromide* of potassium; and in some excitable, highly nervous subjects this salt has been found useful in keeping off the asthmatic paroxysm, when given in 10-grain doses twice or three times a day.

The evidence as to the value of **lobelia** in relieving the asthmatic paroxysm is not altogether satisfactory. It is a very uncertain remedy, and it should not be had recourse to until other more reliable remedies have failed. Besides its uncertainty, its effects are often very disagreeable, causing quite an alarming sense of faintness and sickness. Still, in the treatment of the paroxysm of asthma, we must not altogether discard any resource which has been found efficacious by trustworthy observers, and some appear to value it highly. It should be given in small doses frequently (5 minims of the ethereal tincture every ten minutes until it produces some decided effect). As soon as nausea is experienced it should be stopped, and only repeated at intervals of four to five hours, supposing its effect is beneficial. By giving it in this tentative manner the dose appropriate to each individual will be ascertained. It is best suited to the treatment of the bronchitic form of asthma.

We know little at present of the real value of *Euphorbia pilulifera*, except that its effects in bronchitic asthma have been highly praised by some Australian and American physicians. It is said to have a slightly narcotic effect, and to induce sleep in the asthmatic sufferer. It can be obtained in the form of tincture, the dose of which is 10 to 30 minims.

Grindelia, the fluid extract of the leaves of *Grindelia robusta*, in doses of 10 minims to 1 dram, has

been highly extolled by some American physicians for the relief of spasmodic asthma. Bartholow says "few cases fail to be relieved at once."

Conium, in full doses, has been advocated for the relief of this, as well as of other spasmodic affections.

Hyoscine has also been found useful by some practitioners.

The *bromides* of potassium, sodium, and ammonium have been given frequently in cases of asthma. They are too slow in their action to be of much use in the treatment of the paroxysm, but they are certainly useful during the intervals, especially in highly neurotic subjects, and appear to diminish the frequency of the attacks. We should strongly recommend their employment on the first incidence of spasmodic asthma in young people.

Strychnine alone or, better, combined with *atropine*, in hypodermic injections, has been found very useful in keeping off the paroxysms. At first a daily dose of $\frac{1}{32}$ grain of strychnine and $\frac{1}{160}$ grain of atropine should be given, and this may be slowly increased to $\frac{1}{24}$ grain of strychnine and $\frac{1}{100}$ grain of atropine. If the amelioration is maintained these medicines should be discontinued. We have given with benefit the *arsenate of strychnia* in $\frac{1}{32}$-grain doses, three times a day, in pills with extract of valerian.

Another most valuable remedy in the treatment of asthma, especially the bronchitic and also the gouty forms, is **arsenic.** We have frequently obtained most excellent results from the long-continued administration of this drug. The following is a good formula:—

℞ Liquoris arsenicalis ♏xxxvj.
Spiritus ammoniæ aromatici ʒiv.
Spiritus chloroformi ʒij.
Aquæ camphoræ ad ℥vj.

Misce, fiat mistura. One tablespoonful three times a day in water an hour after food.

Or arsenious acid may be given in combination

with quinine and atropine, as in the following prescription of Sebert's :—

℞ Quininæ muriatis ʒj.
Acidi arseniosi gr. j.
Atropinæ sulphatis gr. ss.
Extracti gentianæ ʒj.
Misce et divide in pilulas lx. One to four daily.

Another convenient mode of giving arsenic in the intervals between the attack is in pills of sodium arsenate and nux vomica.

℞ Sodii arsenatis gr. jss.
Extracti nucis vomicæ gr. xxiv.
Misce et divide in pilulas xxiv. One twice a day, an hour after food.

At the same time 4 to 6 oz. of Bourboule water, which contains arsenate of soda, should be drunk *warm* night and morning.

Dr. S. Solis Cohen * has described a form of asthma in which he has found much benefit follow the use of *adrenal substance.* There are cases in which he believes the vaso-motor control is weak, and therefore, vascular dilation and consequent swelling of the bronchial mucous membrane arise and cause the dyspnœa. In one case he began with 5 grs. of Burroughs and Wellcome's tabloids daily, and finally increased the dose to 90 grs. per diem. In cases of true spasmodic asthma he thinks this drug might prove injurious.

It has been suggested that the asthmatic paroxysm is frequently dependent on *disease* of the **nasal** and **pharyngeal** *cavities*, such as the presence of polypi or hypertrophic and catarrhal conditions, or other morbid states, and that more attention should be given to the investigation of these cavities in considering the etiology and treatment of asthma. The removal of naso-pharyngeal polypi and the radical treatment of diseased conditions of the nasal and

* "The Use of Adrenal Substance in the Treatment of Asthma."—*Journal of American Medical Association*, May 12th, 1900.

pharyngeal cavities have occasionally been attended by disappearance of asthmatic attacks.

Dr. Adam,* of Hamilton, finds the application to the nasal mucous membrane of solutions of cocaine and supra-renal substance often allays the asthmatic paroxysms. He is a strong advocate for nasal treatment.

In all cases, and especially those occurring in children and young people, the nasal fossæ should be thoroughly explored, as well as the throat; enlargement of glandular and other structures of the throat and neck by compressing the vagus or its branches may be concerned in the production of the asthmatic paroxysm; the possibility also of *enlarged bronchial glands* acting as a source of irritation must not be overlooked, especially when asthmatic attacks follow acute infective diseases attended with much bronchial catarrh, as measles, etc. The remarkable curative effects of the iodides and of arsenic in many cases of asthma suggest the possibility of these drugs acting through their well-known influence over glandular inflammation and hypertrophy.

We believe we were almost the first † to call attention in England to the success which had attended the application of the *induced electric current* along the course of the vagus in the neck in some cases of asthma. This mode of treatment had at that time been strongly advocated by Dr. Max Schäffer, of Bremen. The idea was that the source of irritation in some cases could be traced to the swelling of the laryngeal, pharyngeal, or nasal mucous membrane, causing pressure in the neck on the vagus or other nerves in connection with the respiratory tract. The current must be of good strength so that it can be felt as passing through the soft palate from one side of the throat to the other. It should be applied to the throat in the situation of the great nerve trunks, the vagus and sympathetic, each pole being applied just

* *Op. cit.*

† *Lancet*, November 13th, 1880.

below the angle of the jaw, and in front of the sterno-mastoid. Sir Peter Eade subsequently * reported the successful application of this method in a case of bronchitic asthma, with severe paroxysms of dyspnœa, which was under his care in the Norfolk and Norwich Hospital. The patient had been ill and under treatment for seven months before admission to the hospital. For more than two months he had been submitted in the hospital to various remedies, including chloral, iodide and bromide of potassium, lobelia, stramonium, ipecacuanha, opium, conium, carbolic acid, etc., without any satisfactory result, when it was determined to try the effect of the galvanic current in the manner we have described. "The patient was at once relieved, and was nearly cured in eleven days, while he was able to report himself as completely recovered in two or three weeks more."

With regard to the **pneumatic treatment** of asthma, either by the portable apparatus or in the Pneumatic Chamber, it is clear that these methods are not applicable, or very rarely so, to the relief of the *severe* asthmatic paroxysms. These often occur suddenly, and at times and in places when it would be out of the question to apply treatment of this kind. Waldenburg, however, maintains that he has cut short the less violent paroxysms of asthma by the inspiration of compressed air.

But it is in the *intervals* between the attacks, and especially in the catarrhal form of asthma, that most may be expected from pneumatic treatment, in removing or lessening the emphysema which invariably develops after a series of quickly recurring attacks, and in relieving the chronic catarrhal condition of the bronchial mucous membrane. Alternate inspiration of compressed air with expiration into rarefied air is therefore valuable in the intervals, leading to improvement in the emphysema and to a prolongation of the intervals between the paroxysms. In some

* *British Medical Journal*, September 22nd, 1883.

cases it is useful to combine warm aqueous vapour, impregnated with ammonium chloride, with inspiration of compressed air.

Treatment in the *Pneumatic Chamber* is chiefly directed to produce an anti-catarrhal effect, and is, therefore, far more useful, as we have said, in the *catarrhal* than in the *nervous* form of asthma.

Inhalations of oxygen have been advocated for the relief of the asthmatic paroxysms; there can be no objection to trying this expedient, but we have not found it so useful in the severe paroxysms of nervous asthma as in the more continuous dyspnœa of the bronchial form; in these cases, and especially during the intervals of rapidly recurring attacks, it has seemed to be of much benefit and comfort to patients.

One of the most interesting and successful methods of treating bronchial asthma is that carried out at Mont Dore,* in Auvergne, which we have described at length elsewhere.

Having reviewed most of the remedies that have been employed in the treatment of asthma, both during the paroxysm and in the intervals, we are now in a better position to consider its pathology.

After a careful consideration of all the arguments that have been adduced against the nervous theory of asthma, the more we see of cases of asthma, the more impossible it seems to us to resist the conviction that there is a nervous element in every case, and that in very many the nervous element is altogether the predominant one. Let us illustrate this remark by reference to a case of so-called "renal" asthma, not dependent on pulmonary œdema. Here we have blood contamination as an obvious cause of the

* The Mont Dore springs have been erroneously described as "Sulphurated Waters" (Wilson Fox's "Diseases of the Lungs," p. 76). They are really very weak hot alkaline waters, containing about 7 or 8 grains of bicarbonate of soda and 5 or 6 grains of chloride of sodium in the litre. There is also about $\frac{1}{70}$th of a grain of arsenate of soda in the same quantity, and for this reason they have been termed arsenical springs.

nervous disturbance, and the chain of phenomena is tolerably complete. A patient, towards the closing scenes of Bright's disease, with contracted gouty kidney, and hypertrophied heart and thickened arteries, gets sudden attacks of alarming dyspnœa, arising apparently without any cause, sometimes when sitting tranquilly by his fire-side after dinner, sometimes in the middle of the night, or at any other time. He has no cough, no moist *râles*, but expiration is difficult and prolonged, just as in the usual form of asthma; moreover, if you let him inhale chloroform vapour, the paroxysm of dyspnœa disappears. Now, it would seem that in such a case either we have a uræmic irritation of the respiratory centre setting up a sort of convulsion of the bronchial muscles, a sort of pulmonary epilepsy; or we may have a reflex excitement of the bronchial spasm in the following manner: an unusual proportion of the retained urinary excrement is being eliminated at the respiratory surface, and this irritates the peripheral terminations of the respiratory nerves, and so excites in a reflex manner contraction of the bronchial muscles. The urinous odour in the breath is always very marked in these cases.

An explanation which holds good with regard to these renal cases of spasmodic asthma will hold good with regard to others in which the original disturbing cause is not so manifest. The nervous irritation may be central, or it may be peripheral. A certain inherited vulnerability or excitability (hyperæsthesia) of portions of the central or peripheral nervous system doubtless exists in certain persons. When it is the respiratory centre or the respiratory peripheral nerves which are thus affected, we encounter the phenomenon of spasmodic asthma, occurring from causes of irritation sometimes so slight and evanescent as to entirely escape discovery.

But there is another possible view of the mode of action of the "nervous element" in asthma. I allude to the view put forward by Weber. He maintains

that, "for many forms of asthma, the existence must be admitted of a tumefaction of the bronchial mucous membrane in consequence of dilatation of its blood-vessels through vaso-motor nervous influences." Those attacks of asthma which are observed to alternate with attacks of urticaria, and in some of which patches of swollen mucous membrane have been actually observed in the pharynx, would fall under this head. In commenting on this view, Riegel observes: "We may suppose that whenever an irritation affects the bronchial mucous membrane, this irritation may excite vascular turgescence in this region; that the acute tumefaction of the mucous membrane of the bronchioles is the primary element in asthma may explain the milder attacks, but not the severe forms, where a second factor (muscular) must be associated; how otherwise shall we explain the frequently observed 'rapid amelioration after chloral hydrate, and like remedies?'" and he concludes that asthma is a "spasm of the bronchial muscles with simultaneous congestion of the bronchial mucous membrane."

But it must be admitted that the majority of cases of asthma are associated with, and often complications of, a pre-existing bronchial catarrh. But in these cases there is always a nervous element upon which the spasmodic paroxysmal nature of the attack depends. In the first place, the subjects of purely spasmodic asthma may, and do often, become simultaneously the subjects of bronchial catarrh. There is every reason why they should, possessing, as they do, a hyper-sensitive respiratory surface. But there yet remain a considerable number of cases in which the bronchial catarrh certainly appears to be the exciting cause of the asthma. Now such patients may be considered to suffer from hyperæsthesia of the bronchial membrane, just as others suffer from cutaneous hyperæsthesia, and in them the presence of tenacious, thick mucus in the finer air-passages acts as an irritant, and produces that amount of muscular spasm which

is sufficient to give rise to a paroxysm of asthma. Thus it can be shown that in every case of asthma there is a nervous element; but in some cases the nervous state is the only one that needs to be dealt with therapeutically, while in others, where the bronchial irritation depends on the presence of a catarrhal state, the removal of this catarrhal condition must be the basis of any successful medication.

The many practical illustrations that must occur to every one who has seen much of asthma, of its neurotic character, seem to us overwhelming. We will allude to a few only; and first to the frequently observed alternation of attacks of asthma with other neurotic affections, as migraine, angina, hysteria, and certain cutaneous diseases.

It must have occurred to many how very rare it is to see a purely asthmatic paroxysm in the wards of a hospital; yet cardiac diseases and advanced emphysema and bronchial catarrhs are excessively common. If asthma were simply a catarrhal disorder, as some have maintained, its manifestation would be frequent instead of rare in our hospitals.

We have shown the remarkable influence of sedative and antispasmodic remedies in the relief of the asthmatic paroxysm. Numerous other considerations occur to us in support of the neurotic character of asthma; but they seem to be scarcely needed in order to establish a position already so strong. We should like, however, to point out one analogy with a well-known nervous and hysterical phenomenon which seems never to have been remarked upon. We allude to the great distension of the lung which is observed in many cases of asthma—a distension which has often been thought difficult of explanation; but may we not trace an analogy between this great distension of the lung in asthma and the very remarkable and hitherto unexplained tympanitic distension of the intestines often encountered in some cases of hysteria; a condition that will sometimes arise as suddenly as

the asthmatic paroxysm, and which seems to be entirely neurotic in its origin?

But Professor Fraser's extremely valuable and interesting observations * on the influence of the *nitrites* on the dyspnœa of asthma and bronchitis afford an experimental corroboration of the theory of *bronchial spasm* as the cause of the asthmatic paroxysm, and a refutation of the old catarrhal theory, as well as of Weber's theory and its modification propounded by Sir Andrew Clark, that the cause of asthma is a vaso-motor disturbance affecting the vessels of the bronchial mucous membrane, and causing narrowing of the bronchial tubes by vascular intumescence of their lining membrane.

We have now reviewed most of the remedial measures proposed for the treatment of asthma, both during the paroxysm and in the intervals; it will be found that, numerous as these remedies are, one cannot have too many resources in dealing with so capricious a disease as this is, and that remedies that will be most efficient with one individual will fail with another, or will be unable to be persevered with on account of some disagreeable collateral effects. If we had to select a limited number of these remedies to which we were to be restricted, we should choose the following: *Morphine* with *atropine; chloroform;* the *nitrites; fumigations* with *nitre* and *stramonium; stramonium; caffeine; iodide of potassium,* and *arsenic.* Cases occurring in the "gouty," and associated with defective elimination, are especially benefited by potassium iodide in combination with an alkaline carbonate; they require also a mercurial purge from time to time, combined with small doses of colchicum. The treatment, in short, must be, to some extent, directed to the gouty constitution, and sedatives and opiates, so far as possible, must be avoided. Cases associated with chronic bronchial

* "The Dyspnœa of Asthma and Bronchitis: its Causation and the Influence of Nitrites Upon It." By Thos. B. Fraser, M.D., F.R.S. Edinburgh: Oliver and Boyd. 1888.

catarrh and emphysema will, of course, not be cured so long as the bronchial catarrh remains uncured, and our remedies must be directed to curing the catarrhal condition according to the principles laid down in the last chapter. All physicians are agreed as to the utility of free action of the bowels in warding off a threatened attack. A dose of calomel will, in this way, often be of service. Large doses of alcohol have been commended by some, but we should hesitate about prescribing these, as we think there is some danger of establishing an alcoholic habit, and this would certainly favour pulmonary degeneration and emphysema.

We have still a few remarks to make on the subject of the climatic, dietetic, and hygienic management generally of the asthmatic.

As to the **climatic** and atmospheric conditions which are favourable to the cure of asthma, it has generally been taught that patients should be removed to a place which presents the precisely opposite conditions to those which prevail in the locality where the asthma has attacked them, and it has been especially insisted upon that the densely populated, smoky, and stuffy districts of large cities are the most suitable for the relief or prevention of spasmodic asthma. Unquestionably, many cases have been observed by competent observers in which disappearance of the asthmatic paroxysms had attended the removal of the patient to crowded cities; and it is, perhaps, rather a curious circumstance how few sufferers from spasmodic asthma are found amongst the population of the poorest districts of London.

But we are disposed to think that too much has been made of this, and our own experience would point to more numerous instances of the cure of asthma by removal to what might be called *anti-catarrhal* districts; and if it is true, as has been stated, that 80 per cent. of all cases of asthma are complicated with bronchial catarrh, this result

might be anticipated. It is the purely nervous cases that are so capricious with regard to climate and atmospheric conditions; and this capriciousness will be observable even in the case of seaside resorts in close proximity to one another. We have known a patient leave London, on account of asthma, for Deal, and on reaching this place find his asthma worse than in London, but on moving a few miles along the coast to Folkestone his asthma left him immediately. Nervous cases, or cases in which there is a strong nervous element, especially in young people, will often do well in high altitudes, as in the Engadine, and a few catarrhal cases also, in the young and vigorous, will do well in such localities if they encounter a fine season, but in bad seasons they are sometimes injuriously affected. Cases complicated with chronic bronchial catarrh and emphysema should never be sent to these resorts.

Cases in which bronchial catarrh has been the exciting cause of asthma will, some of them, recover completely at Madeira. They leave England feeble invalids, and we have seen them return robust and well. It is as well, however, when they are in a position to do so, that they should return to Madeira for a few months, for three or four successive winters —from December to May. The Canaries offer an alternative resort. At Arcachon, Biarritz, Pau, and at Amélie les Bains we have found asthmatic patients do well in winter. We have known some very bad cases who have avoided returning to England by passing their winters at Pau and their summers at Bagnères de Bigorre. The Riviera resorts cannot be relied on in asthmatic cases, but some asthmatic patients have done remarkably well at Grasse and at Cimiez. Some of the emphysematous and catarrhal asthmatics obtain advantage in the summer from moderate elevations like Montreux or Glion, Lugano, Aussee, Reichenhall, and Meran; in the last two places they can have the advantage of well-arranged pneumatic treatment.

In England we have known the climate of Folkestone and Eastbourne, in the summer, to be very useful to some cases, and that of Bournemouth, Ventnor, and Hastings in the winter. The pine district around Woking, Weybridge, and Ascot has also been of service in numerous instances.

Bronchitic cases should be warmly clad, should avoid all causes of catarrh, and should live in well-warmed, suitably ventilated apartments, and should not be made to sleep in *cold* bedrooms. It is worth noting that the asthmatic paroxysm often occurs during the coldest part of the night, viz. between 2 and 4 a.m. We know many sensitive persons who at once wake up in the night if there is a fall of temperature, and it is quite conceivable that, if an asthmatic woke up in such circumstances, he would wake up with an attack of asthma. Suitable *gymnastic exercises* have been found useful in keeping off attacks in children. Exercise in the open air (*not fatiguing* exercise), and cold sponging, when it can be borne, followed by friction with a rough towel, are good hygienic measures for removing undue sensitiveness of the surface.

As asthmatic paroxysms are often induced by digestive disturbances, it is of the highest importance to see to the proper regulation of the diet and meals of an asthmatic patient, in the intervals between the attacks. All indigestible articles of food should be avoided, but especially those which he has learnt by experience are prone to induce a paroxysm. Suppers and late dinners are to be forbidden, and the principal meal should be taken in the middle of the day.

Cod-liver Oil has been found of great service in certain badly-nourished patients.

The adoption of a vegetarian dietary has been found of value in some cases.

Tendencies to constipation and flatulence should be guarded against by some suitable aperient. An aloes and ipecacuanha pill after dinner is the best in many cases; and an occasional dose of Carlsbad salts

may be added. Any disorder of the female sexual organs must, of course, be remedied.

All depressing emotion should be avoided; but pleasurable ones sometimes have the effect of dissipating the attack.

Hay Fever or Hay Asthma.

This malady is also known by other names, as "rose cold," "*Catarrhus Æstivus*," "*Coryza vasomotoria*," and "*rhinitis hyperœsthetica*."

It may occur in either of two forms—the *catarrhal* or the *asthmatic*.

The first form resembles an acute coryza, coming on with sudden irritation of the nasal, conjunctival, and faucal mucous membranes, and attended with distressing sneezing. The *asthmatic* form usually comes on a week or so after the catarrhal form; but the asthmatic symptoms may also develop early. Often on the appearance of the asthmatic symptoms the nasal symptoms cease.

The *cause* of these paroxysmal attacks is threefold:—First, the contact or influence of an *external irritant*, acting, secondly, on an *hyperœsthetic* mucous membrane in, thirdly, persons of a *neurotic* (often inherited) constitution.

The most common external irritant is the *pollen* of certain grasses (hence the name "hay fever") and of other plants. The existence of these irritating agents in the air at *certain seasons* accounts for the fact that in Europe this disease is especially prevalent in the spring, while in America it is most common in autumn, *i.e.* from the middle of August to the latter part of September.

In this country the pollen of several of the grass family have been proved to be capable of exciting this disease, but in America the pollen of *Ambrosia artemisiæ folia* (rag-weed) and that of *Solidogo odora* (golden-rod) have been especially implicated. The odours of roses and other sweet-smelling plants have the same effect on certain persons. Certain powders,

other than pollen, such as ipecacuanha, lycopodium, etc., have been found to give rise to similar symptoms.

It is, however, certain that the pollen of plants is the principal exciting cause of hay fever.

It has been asserted that in many persons prone to this malady the nasal mucous membrane is diseased (*hypertrophic rhinitis*), and is excessively sensitive, so that the merest touch with a probe will bring on an attack. Others,* however, maintain that there is no essential connection between the two.

The *symptoms* complained of in the *catarrhal* form are those of an intense coryza, viz. distressing irritation and congestion, with excessive secretion from the eyes, nose, and upper air-passages, usually attended with frontal headache, more or less cough, distressing sneezing, and considerable depression of spirits.

In the asthmatic form we encounter the symptoms of bronchial asthma, which may follow the preceding or alternate with them.

In many sufferers there is a liability to a return of the malady annually at the same date, which will, however, be found to vary with the seasons, according as they are early or late.

Many authorities consider the *gouty* constitution an important predisposing influence in the development of this disease.

In the etiology of this affection we have thus to admit: 1st, an external irritant; 2nd, local hypersensitiveness; and 3rd, a constitutional tendency—neurotic or gouty, or both combined.

With these few preliminary considerations, we may now enter upon the question of *treatment.*

The indications for treatment are like the causation, threefold:—

1. To avoid or suppress the local irritant.
2. To diminish the local sensitiveness and to relieve the local congestion.
3. To modify the predisposing constitutional state.

* *E.g.*, Garel, "Le Rhume des Foins," Paris, 1899.

1. The surest means of avoiding the local irritant is, when practicable, *a change of climate.* If the sufferer from hay fever could always live on the sea during that period of the year when the pollen of grasses and other plants is carried by winds into the air he has to breathe, he would escape the attacks. Removal also to places on the sea-coast which are situated at a distance from cultivated land and vegetation is almost as good. High altitudes, where the land is not cultivated, will answer as well. In America the White Mountains of New Hampshire is a favourite resort.

Much, however, may be done to avoid the irritant cause by those who may not be in a position to avail themselves of change of climate. They must avoid cultivated districts, fields, woods, and gardens, when the grasses are flowering. They must avoid exposure to the open air during high winds, when dust may be blown about and enter their air-passages; exposure to bright sunshine is irritating, and travelling by rail, by motor or bicycle, on horseback, or in an open carriage, are all to be avoided because of the exposure to dust which attend such means of locomotion. Large, dark spectacles, fitting close to the orbits; broad-brimmed hats to keep off the sun's rays, thick gauze veils, are all useful protections and preventives.

2. A vast number of expedients have been suggested and tried for the relief of the local sensitiveness, congestion, and irritation. One of the simplest is the application of an oily spray to the nasal mucous membrane, such as liquid *vaseline* or *albolene*, containing about 5 per cent. of menthol dissolved in it. This can be applied by a special pulveriser for spraying oily fluids. It covers the mucous membrane with a sort of protective varnish, which shields it from external irritants or lessens their irritating effects. The menthol, at the same time, acts as an antiseptic, and also allays existing irritation. Great relief has been experienced from a spray of *cod-liver oil* (the *deodorised* oil is used)

applied to the nostrils by means of a hard rubber atomiser every three hours, or oftener if necessary.

Various *antiseptic* lotions have been recommended and found serviceable, viz. carbolic acid in strong solution, applied by a brush to the sensitive areas—previously anæsthetised by cocaine—a solution of perchloride of mercury, 1 in 3,000—a combination of these with quinine (bichloride of mercury 2 grains, hydrochloride of quinine 30 grains, and glycerine of carbolic acid ʒj). Resorcin (after removal of any diseased condition of the nasal mucous membrane) has been stated to give excellent results; it has been prescribed as a lotion, as follows: Resorcin gr. 1½, sodii chloridi gr. 4, acidi aceti ♏ 2, aquæ ad ʒj. This should be applied frequently.

Müller, of Vienna, combines resorcin with menthol: Resorcin ʒiss., menthol ʒiss., alcohol ʒv.

Protargal, a non-irritating silver salt, has been used in Professor Fraenkel's clinic in Berlin. A ½ per cent. solution is used at first, and stronger ones subsequently, if they cause no irritation. They are applied with a sort of massage to the nasal mucous membrane. It is recommended to commence this treatment as a preventive three or four weeks before the expected attack.

Hydrozone, a preparation of hydrogen peroxide, 1 oz. to 12 oz. of sterilised water, has also been used successfully as a preventive. It is applied as a douche, tepid or cold, four times a day for a fortnight before the period of the attack—its strength being gradually increased.

Cocaine has been very largely employed in this affection, alone, or in combination with some of the preceding, as an anæsthetic. Latterly the dangers attending the use of this drug have been much emphasised, and perhaps a little exaggerated.

Apart from the risk of exciting the cocaine habit, it is urged that there is danger of reaction after its use, and the production of local paresis of vessels.

It is undoubtedly a useful palliative—it has been

applied in a 2 per cent. solution, with a small spray producer, with great relief to symptoms, using about ½ grain (25 minims) at a time, and spraying the eyes lightly at the same time, with lids half closed.

Atropine (and belladonna) and *morphine* (and opium) have been given, together and separately, to relieve the distressing symptoms; and this they do as in ordinary attacks of coryza. One authority has given as much as $\frac{1}{25}$ grain of atropine daily; but such remedies can only be palliative, and they are attended, when given in full doses, by very disturbing effects of their own, and in our opinion should only be employed very occasionally, and in moderate doses, and at the onset of attacks, to allay severe and distressing symptoms.

Inhalations of chloroform, iodine, or alcohol have occasionally given relief, and the distressing itching of the conjunctivæ has been benefited by lotions of borax or boric acid dissolved in camphor water, 10 grains to the ounce.

But recently the use of *supra-renal substance*, or extract, has been greatly vaunted by S. Solis Cohen and others in the treatment of this affection. Solis Cohen, himself a sufferer from this malady, took a 5-grain tabloid of supra-renal substance (Burroughs and Wellcome's) five times a day, the last at bed-time, and derived very great benefit from the treatment. He allowed the tabloids to dissolve in the mouth. He considers it acts by increasing the vascular tone, and bringing about contraction of the blood-vessels of the nasal mucous membrane. This remedy should be applied locally as well as internally. For the former purpose a solution can be prepared by shaking up 6 to 12 per cent. of saccharated dried extract of the supra-renal gland with water, allowing it to stand, and removing the clear solution, which may be applied either as a spray or on plugs of cotton-wool saturated with the solution.

Still more recently a crystalline principle separated from the supra-renal gland, and termed

"*adrenalin*," has been used for local applications—a solution 1 in 5,000—and applied in the same manner as the preceding. A stronger solution has also been used up to 1 in 1,000, combined with 2 per cent. of *chloretone*, as an anæsthetic and preservative. It is said to "reduce the extreme engorgement of the turbinal tissues, and allay the intense irritation."

Surgical operative measures commend themselves greatly to many specialists, and they are doubtless needful in certain forms in which local disease exists in the nasal cavities. "The removal of nasal polypi, or any spur from the septum that impinges upon the outer wall, linear cauterisation along any hypertrophied or tumified turbinated bodies, and, most important of all, the superficial cauterisation of all places found to be extremely sensitive"* are the measures to be carried out.

The galvano-cautery is generally used for these cauterisations as by far the most satisfactory.

The operations are recommended to be done not during the attack, but in the free months preceding it.

3. As to general constitutional treatment. In the neurotic, nerve tonics, such as preparations of phosphorus, arsenic, and strychnine, are indicated.

Valerianate of zinc has been found useful in such cases by many practitioners—2 or 3 grains three times a day may be given. A combination of sodium bromide and infusion of valerian has also been found serviceable. When obvious debility accompanies neurasthenia, preparations of iron, quinine (the hydrobromide) and cod-liver oil may prove useful, especially in helping to ward off expected attacks.

In the gouty and dyspeptic, alkaline mineral waters have been found of benefit, combined with aperients containing a little colchicum or some other hepatic stimulant.

* Prof. Ingale, "Hare's System of Practical Therapeutics" (new edition), vol. iii., p. 736. Dr. Garel, "Le Rhume des Foins," p. 87; Paris, 1899.

PULMONARY EMPHYSEMA.

We are unable here to enter upon the consideration of the many interesting questions that are concerned in the discussion of the pathology and etiology of pulmonary emphysema, and we can only refer, very briefly, to those points which have an essential bearing on the indications for treatment.

Pulmonary emphysema was correctly and briefly defined by Laennec as "an excessive, permanent, and abnormal distension of the air-cells." This, of course, applies to "*vesicular*" emphysema, for "*interlobular*" emphysema—*i.e.* the passage of air into the connective tissue between the lobules of the lung—does not here concern us, as it is a condition practically removed from effective treatment. We may generalise the **causes** of vesicular emphysema by saying that it is either due to excessive strain on the interior of the *normal* air-cells, whereby they lose more or less of their elasticity and become dilated, as in violent inspiratory and expiratory efforts, and especially the latter; or it is determined by degenerative and atrophic changes in the walls of the air-cells themselves, by which they lose their normal resisting power; or the two conditions may, to some extent, be co-operative.

We encounter pulmonary emphysema in various degrees, sometimes very slightly developed and sometimes in a very advanced stage; sometimes partial—*i.e.* affecting only certain portions of one or both lungs—and sometimes general. The partial forms are often what is termed "compensatory"—*i.e.* a dilatation of certain groups of air-cells to take the place of others that are collapsed or for some cause or other rendered ineffective. These "compensatory" forms are often rather conservative than injurious, and partake of the nature of compensatory hypertrophy, and do not therefore concern us here.

One of the chief **indications** in the **treatment** of this disease is to prevent slight cases becoming severe ones by withdrawing the patient from the

influence of those conditions which produce it. The early stages of emphysematous dilatation of the air-cells very commonly arise from the strain of athletic exercises during the period of growth and development, especially in comparatively feeble organisations. On examining the chests of youths who have submitted themselves to strain of this kind, it will be found that the inspiratory expansion is very limited, the excursion of the chest in passing from the forced expiratory to the forced inspiratory position often not exceeding an inch or an inch and a quarter. This is often overlooked, and the subjects of it are not cautioned, as they should be, against pursuing *sports* or *exercises* for which they are unsuited, and which lead in course of time to both pulmonary and cardiac strain.

As this disease very frequently originates in and becomes aggravated by repeated attacks of bronchial catarrh and the paroxysms of coughing which accompany them, the prophylactic indication points also to the removal of such patients from the predisposing and exciting causes of such attacks, especially removal in winter to a more congenial and anti-catarrhal climate, if the patient's means admit of this. Emphysema frequently has its origin in severe and protracted attacks of whooping-cough in early life, a disease which we shall hope to show is much more amenable to rational treatment than is generally recognised.

Asthma is a disease which usually, in course of time, leads to the production of emphysema of a severe form. When emphysema is a complication of *asthma*, or is associated, as it so constantly is, with chronic bronchial catarrh, the indications for treatment both prophylactic and remedial must be sought to a great extent in what we have said of the management of those diseases, which we need not now repeat.

The avoidance of all physical *strain*, and the strict limitation of physical exercises to such as are gentle

and in no degree excessive, and the protection of the patient from all causes of catarrhal attacks, are the chief indications in the treatment of emphysema, and for preventing the slighter degrees from advancing into the more serious forms.

There is little in the way of remedial measures that can be directly applied to the dilated and atrophied lung tissue, to the restoration of the lost elasticity of the air-cells, or to the restoration of the obliterated capillaries in their walls. Arsenic and iodide of potassium have both been credited with the power of retarding degenerative changes, and both are of use in the treatment of catarrhal and dyspnœic states, as we have already shown. When emphysema is associated with an acute catarrhal condition of the air-passages, whatever can free the air-passages from the secretions obstructing them by promoting expectoration will, of course, be beneficial. For this purpose saline, alkaline, and ipecacuanha sprays have been applied and found useful.

Free evacuation of the bowels, and measures to relieve any flatulent distension, are very needful in cases of emphysema to take off from the diaphragm any pressure from below, and to allow it to descend as freely as possible. With this view also the food should be concentrated, nourishing, and not bulky.

If we apply ourselves to dealing with the emphysematous condition of the lungs apart from co-existing catarrhal states, our chief resource must be those tonic and hygienic measures that are calculated to improve the general nutrition—air, climate, food, exercise, and tonic medicines, such as iron, arsenic, strychnine, cod-liver oil—selected and adapted to individual cases and on general principles. We must remember that we have, in all advanced cases, a state of dilatation of the right side of the heart to deal with, which will also be benefited by this *general* tonic treatment.

Attempts have been made to remedy the pulmonary condition, and to improve the respiratory functions in emphysematous cases, either by causing

them to breathe compressed air in the Pneumatic Chamber, or by means of a portable apparatus * to inspire compressed air and expire into rarefied air. No doubt great relief to the dyspnœa such patients suffer from is often experienced from expiration into rarefied air. The suction-action exerted on the air in the lungs leads to more complete pulmonary ventilation, to the removal of stagnant air in the air-cells, and to the free entrance of fresh air. The physical signs also often show a marked improvement in the condition of the lungs.† When there is co-existing bronchial catarrh it is necessary to precede the expiration into rarefied air by inspiration of compressed air, else irritative cough is excited.

Treatment in the compressed-air chamber has also been attended with good results, in not too advanced cases, and it is especially applicable to cases complicated with chronic bronchial catarrh, which it relieves. At Reichenhall inhalation of the saline spray is combined with treatment in the Pneumatic Chamber. How this method acts has been the subject of much discussion; it probably increases the flow of blood through the lung, and so improves its nutrition.‡

* The various forms of apparatus devised and used for this purpose will be found fully described in the author's translation of Oertel's "Respiratory Therapeutics." (Smith, Elder and Co.)

† *Ibid.*, p. 541.

‡ *See* Oertel's "Respiratory Therapeutics," p. 693, for a full discussion of this question.

ADDITIONAL FORMULÆ.

For the non-paroxysmal dyspnœa of asthmatics.

℞ Chloral hydrate, ʒij.
Ammonii chloridi, gr. lxxv.
Morphinæ hydrochl., gr. jss.
Antimonii tartarati, gr. j.
Grindeliæ robustæ fluidi extracti, ʒvj.
Syrupi glycyrrhizæ, ℥j.
Aquæ ad ʒiij.
M. f. mist. A teaspoonful in water every three to six hours.
(*N. S. Davis.*)

Or

℞ Chloral, ʒv.
Sodii nitritis, gr. xlv.
Tincturæ stramonii, ʒiv.
Syrupi simplicis ad ʒiij.
M. f. mist. A teaspoonful in water every four hours.
(*N. S. Davis.*)

Anti-asthmatic mixture.

℞ Potassii iodidi, ʒij.
Liquoris Fowleri, ʒj.
Vini ipecacuanhæ, ʒij.
Tincturæ hyoscyami, ʒiv.
Aquæ chloroformi ad ʒviij.
M. f. mist. A tablespoonful three times a day in water after food. (*Whitla.*)

Mixture in bronchial asthma.

℞ Extracti quebracho, ʒj.
Morphinæ hydrochl., gr. ss.
Syrupi simplicis, ʒv.
Aquæ mellissæ ad ʒiv.
M. f. mist. A tablespoonful every two or three hours.
(*Bamberger.*)

Another.

℞ Chloral hydrate } āā gr. xx.
Potassii iodidi }
Syrupi simplicis, ℥ss.
Aquæ, ℥iv.
M. f. mist. A fourth part every two to four hours.
(*Schnitzler.*)

Lobelia mixture for the asthmatic paroxysm.

℞ Tincturæ lobeliæ, ℥j.
Ammonii iodidi, ʒij.
Ammonii bromidi, ʒiij.
Syrupi tolutanæ, ℥ij.
M. f. mist. A teaspoonful every one, two, three, or four hours. (*Bartholow.*)

Mixture for asthma.

℞ Tincturæ lobeliæ, ʒvj.
Potassii iodidi, ʒij.
Tincturæ camphoræ compositæ, ʒvj.
Decocti senegæ ad ℥vj.
M. f. mist. A tablespoonful for a dose. (*Green.*)

Bromide and iodide mixture for spasmodic asthma.

℞ Potassii bromidi, ℥j.
Potassii iodidi, ℥ss.
Aquæ ad ℥iv.
M. f. mist. A teaspoonful in sufficient water every half hour or hour.

Another.

℞ Extracti grindeliæ fluidi, ʒij.
Extracti lobeliæ fluidi, ʒj.
Extracti belladonnæ fluidi, ℥ss.
Potassii iodidi, ʒjss.
Glycerini, ℥jss.
M. f. mist. A teaspoonful for a dose. (*Bartholow.*)

Pills for nervous asthma.

℞ Sodii iodidi, ʒjss.
Pulveris et extracti glycyrrhizæ, ʒj.
M. et divide in pil. lx. Five to eight to be taken twice a day. (*Benedikt.*)

Powder for fumigation.

Stramonium leaves, 4 drams.
Green tea, 4 drams.
Lobeliæ, 1½ dram.
Mix and pour on the mixture enough saturated solution of nitre to wet it. Dry it and preserve in a closely stoppered bottle. (*Plant.*)

Another.

Stramonium leaves, coarsely powdered, 2 oz.
Anise fruit, powdered, 1 oz.
Nitre, powdered, 1 oz.

Mix. A little of this to be placed on a plate and ignited. (*Sawyer.*)

Another.

Datura tatula, 2 drams.
Stramonium leaves, 2 drams.
Cannabis indica, 2 drams.
Powdered nitre, 2 oz.
Oil of eucalyptus, ½ dram.

Mix thoroughly. Put a teaspoonful on white paper in a saucer, and burn in bed-room.

(*This powder is very warmly recommended by Dr. Woodward, of Worcester.*)

Another.

Stramonium leaves, 1 oz.
Lobelia, ½ oz.
Belladonna, ½ oz.
(Grind thoroughly in a mill.)
Nitre, powdered, ½ oz.
Laudanum, ½ oz.

Dissolve the nitre in the smallest possible quantity of hot water, and add the laudanum; with this thoroughly saturate the minced and ground leaves, and dry at a gentle heat. When dry, mix well with powdered camphor and keep in a stoppered bottle. (*S. B.*)

Mixture for catarrhal asthma.

℞ Vini ipecacuanhæ, ʒss.
Tincturæ lobeliæ æthereæ, ʒjss.
Misturæ ammoniaci, ʒiij.
Aquæ ad ℥vj.

M. f. mist. Two tablespoonfuls for a dose.

(*Royal Chest Hospital.*)

CHAPTER V.

THE TREATMENT OF PNEUMONIAS.

I. Acute Lobar Pneumonia.—Symptoms, Physical Signs, and Anatomical Lesions—Etiology—Pneumonia a Specific Infective Fever—Influence of Chill—Climatic and Atmospheric Influences—Predisposing Causes—Evidence in Favour of its Specific Microbic Origin—*Indications for Treatment*—General Considerations deducible from the Natural History of the Disease—Quinine—Mode of Employing It—Formulæ—Temperature Chart—Aconite—Jurgensen's Estimate of Quinine—Antiseptic Agents—Pneumotoxin and Antipneumotoxin—*Serum Treatment—Treatment of Symptoms*—Pyrexia and Hyperpyrexia—Cold Baths—Varying Opinions—Local Applications of Cold—Icebags—Digitalis—Antipyrin—Phenacetin—Sodium Salicylate—Pain—Leeches, etc. etc.—Dyspnœa—Blood-letting—Strychnine by Hypodermic Injection—Oxygen Inhalations—Ether and Morphine in Nervous Forms—Delirium—Sleeplessness—Cough—Gastric Catarrh—Diarrhœa—*Treatment of the Tendency to Cardiac Failure*—Food—Alcoholic Stimulants—Hypodermic Injections of Ether and Caffeine—*Saline Hypodermic Injections*—Disinfection—*Treatment of Convalescence.*

II. Catarrhal, Lobular, or Broncho-Pneumonia.—Mode of Origin—Course—Anatomical Lesions—Symptoms and Physical Signs. *Indications for Treatment*—Emetics—Sprays—Saline Drinks—Treatment of Symptoms—Cough—Pyrexia—Gastro-intestinal Symptoms—Nervous Symptoms—Respiratory Failure—Stimulants—Food—Convalescence.

III. Secondary Pneumonias.—Gangrene of Lung. Additional Formulæ.

In dealing with the important subject of the **treatment** of **pneumonias** our task will be facilitated by dividing them into three classes: (1) *acute lobar pneumonia*, the "*croupous*" pneumonia of German writers; (2) *catarrhal, lobular*, or *broncho-pneumonia*; and (3) *secondary pneumonia—i.e.* pneumonia supervening in the course of other diseases.

I.—Acute Lobar Pneumonia.

We shall first deal with acute lobar pneumonia, characterised by the following **symptoms, physical signs, and anatomical lesions:—**

The attack usually begins suddenly with a well-marked *rigor*. The temperature rises rapidly, and may reach 104° in a few hours from the initial rigor. The skin feels to the touch peculiarly hot and dry; after the chill, a bright *red flush* is noticed on one or both cheeks, especially over the malar region, the eyes are glistening, the expression anxious, the nostrils working, and there is often a patch of herpes on the lips. There are the usual symptoms of fever—loss of appetite, thirst, furred tongue, headache, aching of the limbs, general malaise, scanty, high-coloured urine. The pulse is quickened, as are the respirations, and it has been noted that, in most cases, the pulse and respiration ratio is disturbed; but this is not so uniformly the case as some authors maintain. The respirations may be accelerated to thirty, forty, up to sixty in the minute, while the pulse-rate may range between 100 and 130; but it is not uncommon to find a much higher pulse-rate during some part of the course of the disease.

Besides these *general* symptoms, there are others complained of, referrible to the local lesion. These may not appear until twelve or twenty-four hours after the appearance of the general symptoms. *Pain* in the side is one of these, and is dependent on the existence of *pleuritis* over the portion of inflamed lung. It is sometimes extremely severe (in a few cases it is absent), and it is aggravated by the respiratory movements; the patient endeavours to check these, and so increases the shallowness and, therefore, the rapidity of the respirations. *Cough* is another symptom, which is restrained by the patient as much as possible on account of the pain in the side that attends it. The cough is accompanied by *expectoration* which is brought up with difficulty, as it is scanty, and extremely tenacious and viscid. It usually contains blood mixed with it, altered in colour, so as to give to the sputum a "rusty" hue, or it may be bright red or of paler tint. Cough and expectoration are sometimes absent in children.

When the disease runs the usual average course it is common for the fever to terminate by "crisis," generally between the fifth and eighth days, sometimes a day or two earlier or later. The temperature falls rapidly, and in from six to twenty-four hours may reach or descend below the normal. From this moment the convalescence is often rapid.

Associated with these symptoms the following *physical signs* may usually be found on examination of the chest. Usually over the base of one lung (the right most frequently), sometimes over the upper lobe, some *loss of resonance*, increasing as the disease advances to complete *dulness* on percussion, is found; over this area of dulness fine *crepitations* can usually be heard, with the inspiration, at the onset of the attack. When the lung, however, becomes *solid* from exudation into the air-cells, this sound disappears. Friction sounds are also frequently detected over the inflamed lung from involvement of the pleura in the inflammation. *Tubular*, *bronchial* breathing, and *bronchophony* are also usually to be heard over the affected portion of lung; there is also, commonly, *increased vocal fremitus* in this situation.

These physical signs and the *pulmonary* symptoms depend upon the presence, first, of acute hyperæmic engorgement of the lung; and, secondly, of exudation into the air-cells, this exudation consisting chiefly of fibrin mixed with red and white blood corpuscles and epithelial cells.

No one has ever seen the appearances presented by a *living* lung in pneumonia, and such descriptions as are given in text-books of the different stages of pneumonia are, it must be remembered, merely descriptions of post-mortem appearances.

It is common to speak of three stages:—First, a *stage* of *engorgement*, or vascular dilatation and distension; secondly, a stage of *red hepatisation*, when the air-cells are filled with a solid exudation; and thirdly, a stage of *grey hepatisation*, when the exudation into the air-cells is undergoing degenerative changes,

but this change in colour may be only a *post-mortem* appearance. As we are only concerned now with the clinical history and course of pneumonia, enough has been said to *characterise* the form which we are at present considering. As recovery proceeds the exudation into the air-cells melts down, and disappears, some of it being expectorated, but most of it being absorbed. The pulmonary tissue again becomes permeable to air, the physical signs disappear, and the normal condition of the lung seems to be completely restored.

The *symptoms* we have mentioned as attending the course of acute pneumonia assume, in some cases, an aggravated character, and are accompanied sometimes by others even more serious still. We shall have to consider these fully: the *pain* in the side may be intense and almost unbearable; the *cough* may be so frequent as to threaten to exhaust the patient; the *pyrexia* may be so great as to demand active interference for its reduction; the *dyspnœa* may be extreme, and life may be threatened either from the extent of the inflammatory exudation, or from collateral pulmonary engorgement, or from cardiac distension and enfeeblement. *Sleeplessness and delirium* are both serious and distressing symptoms which are often present, and require careful attention. The most serious condition of all is the tendency to *cardiac failure*, the danger of which in severe cases should never be lost sight of.

We have yet to pass in review the question of **etiology** before we can satisfactorily set forth rational indications for the treatment of this disease.

The opinion that this form of pneumonia is not merely a local disease, with symptomatic pyrexia, as was formerly believed, is now universally adopted, and primary, acute, lobar pneumonia is regarded as an acute specific general disease, a *specific infective fever*, caused by a *specific poison*, an *infective microbe*, the lung affection being simply the characteristic local lesion.

The idea formerly so prevalent that pneumonia was generally caused by **chill** has been shown to be erroneous, for careful investigation has proved that but a small percentage of cases of acute lobar pneumonia can be traced to chill. Still, in a certain proportion of cases, chill from exposure to cold seems to be a contributing cause. This is not inconsistent, as we shall see, with the view that its exciting cause is a specific organism. With regard to *climatic* and *atmospheric* influences, all that can be positively asserted is that the prevalence of pneumonia is not determined by *cold* alone, but that the presence of great vicissitudes of temperature, and especially exposure to cold winds from the north-east, seem to be related causally with its periods of greatest prevalence. In Great Britain it is most prevalent in April and May—a period when there is much exposure to easterly winds, rapid and great variations of temperature, and at times high degrees of atmospheric moisture.

It is notorious that the state of the general health is *lowered* during the prevalence of these atmospheric conditions, and the constitution is less capable of resisting the invasion of infective germs. And, as we have pointed out elsewhere, "winds are carriers of dust as well as abstracters of heat; and while, on the one hand, they carry away heat from the surface of the body, on the other hand they gather up dust of all kinds, and blow all manner of micro-organisms into our air-passages. Any depressing agency may predispose to pneumonia, such as exhaustion from physical fatigue, and depressing emotions; and it may be that exposure to a cold wind acts both as a predisposing cause, by depressing the normal resisting power by rapid abstraction of heat, and also as an exciting cause, by means of the micro-organisms it blows into our air-passages."

Debilitating conditions, early childhood, and advanced age, in association with unfavourable atmospheric influences, are, therefore, predisposing causes. There also would appear to be an individual predis-

position to this disease, some persons having suffered from a number of attacks.

The **specific germ** which is regarded as the cause of pneumonia is the *micrococcus lanceolatus* of Fraenkel. It is a slightly elliptic or lance-shaped coccus, united in pairs—hence the name diplococcus; it is also often termed the *pneumococcus*. It has been found in the mouth, the nose, the Eustachian tubes, and the larynx of a certain proportion of healthy persons. It is found in the lungs in about 90 per cent. of all cases of pneumonia.

It is thought probable that other micro-organisms, such as Friedländer's bacillus, Eberth's bacillus, and the streptococcus of erysipelas, may also have the power of exciting pneumonia. The germ is probably received into the lungs by *inhalation*, so that these organs are first affected. But the toxins it forms are soon diffused throughout the organisms, causing a general infection.

Having referred thus briefly to the clinical characters and the etiology of acute lobar pneumonia, we may now proceed to the consideration of the **indications** for its **treatment.**

1. The first indication springs out of etiological considerations, viz. *to endeavour, if possible, to antagonise the injurious influences of the specific infective organism on the blood and the tissues.*

2. The second indication is obvious, viz. *to relieve and to endeavour to subdue dangerous or distressing symptoms.*

3. The third indication is also obvious, viz. *to support the patient's strength, and to endeavour to remove or moderate all conditions tending to exhaustion.*

We believe these three indications will cover the whole ground of the rational treatment of pneumonia.

Although possessing a certain historical interest, it would be a waste of time to examine here the various routine methods of treatment of pneumonia formerly pursued, and now abandoned—such as repeated blood-letting, large and repeated doses of tartar emetic,

calomel, and other so-called *antiphlogistic* measures. Nor shall we occupy valuable space by extended references to statistics. The fallacies underlying this method are especially evident in their application to the treatment of such a disease as pneumonia, as it takes no account of an infinite variety of modifying conditions that affect results, apart from the particular point this method may be called in to investigate.

Skoda and Dietl, in 1847, may be regarded as, to some extent, the founders of the modern treatment of pneumonia, for they showed that whereas, when cases of pneumonia were practically left to themselves, or treated on the so-called *expectant* method, the mortality was rather less than 8 per cent., when treated either by *blood-letting* or by *tartar emetic* the mortality was nearly 21 per cent.

Having regard to the relative success of the **expectant** method, and to the natural history of cases of pneumonia, it has been maintained that the attempt to draw any conclusions as to the efficacy of any particular medicinal interference in the treatment of this disease is so beset with possible fallacies as to be useless; for since pneumonia is so prone, when left to run its natural course, to terminate suddenly and rapidly in complete recovery, therefore it is quite unjustifiable, however good the results that follow any line of medicinal treatment may be, to maintain that they are *due* to that treatment, and not merely the natural issue of a series of remarkably benignant examples of the malady. This, it seems to us, is to assert *too much*. Surely a practitioner of experience and judgment, of acute observation and quick perception, acquires the faculty of distinguishing a *prolonged series of consequences* from a *prolonged series of mere coincidences*.

To deny such powers of discrimination to others, or to pretend to reserve them to ourselves, is both unjust and egotistic. If such a practitioner sees that he obtains, in a uniform manner, better results with

a particular method of treatment than with other methods of treatment, he may surely trust the observation of his own senses, and conclude that it has had something to do with the better results obtained. And it must be remembered that the careful and guarded impressions of such an observer are worth more than the evidence of blindly and mechanically compiled statistics, accumulated by a variety of persons with very variable faculties for accurate observation and just inference.

We have, ourselves, been led in this way to the conclusion that **quinine** frequently exercises a beneficial influence over the course of acute pneumonias of the class we are considering. And this belief has impressed itself on a considerable number of other observers. We do not, however, look upon this drug merely as a depressor of temperature, as some appear to do, but we regard this effect as incidental to some direct action on the infective morbid agent, or on its activities. We have been led to conclude, from facts observed, that quinine is in some degree an *antitoxin* to the toxins of many infective germs, in what precise manner it is impossible at present to say. To call this effect "*germicidal*" is unjustifiable, because it may possibly act in some way quite unconnected with the death of the germs.

We have not given quinine in the *large* doses advised by Jurgensen and others; but we have always given it in a special manner, which we believe greatly influences its favourable action. We give from 1 to 3 grains every two to four hours, according to the age of the patient and the apparent severity of the attack, and we give it dissolved in citric acid, and then added to an alkaline mixture, so that it is really taken in an effervescing saline draught.

We have had abundant reason for believing that quinine given in this form has quite different activities from what can be obtained from it in the solid form or dissolved in mineral acids. We therefore

regard the adoption of this form of using it as all-important.

The following is the formula we usually prescribe :—

℞ Quininæ sulphatis gr. j. ad iij.
Acidi citrici gr. x ad xv.
Sacchari* lactis gr. x.
Misce, fiat pulvis.

This powder is dissolved in a little water and added to the following draught :—

℞ Potassii bicarbonatis gr. x ad xv.
Ammonii carbonatis gr. iij ad v.
Syrupi aurantii ʒj.
Aquæ ad ʒj.

Misce, fiat haustus. This dose is given every two, three, or four hours, according to the age of the patient and the severity of the case.

We append copies of the charts showing the course of the pyrexia in three consecutive and typical cases thus treated (Fig. 16). They were cases of quite average severity. One (case 2) was an alcoholic case, and one (case 3) was a boy with pneumonic consolidation of the *whole* of the right lung.

Case 1.—Male, aged 40. *Pneumonia*, lower lobe right lung, with pleuritic friction; had chronic bronchial catarrh before the attack. Systolic murmur at cardiac apex. Highest respiration rate, 55; highest pulse rate, 160. Tongue brown, dry, and tremulous. *Stimulant*, 6 to 8 oz. of brandy in twenty-four hours. Convalescence uninterrupted.

Case 2.—Male, aged 32; alcoholic. *Pneumonia* of right lower lobe and pleuritic friction, complicated with *delirium tremens* (not violent). Highest respiration rate, 30; highest pulse rate, 126. Tongue very dry and brown. *Convalescence* rapid and uninterrupted.

Case 3.—A boy, aged 7. *Pneumonia* of *whole* of right lung; dulness absolute from base to apex, back and front. Pleuritic frictions at base. Œdematous crepitation at extreme base of *left* lung. Highest respiration rate, 54; highest pulse rate, 180. In addition to quinine in

* The sugar is necessary to prevent the acid and the quinine from caking together and sticking to the paper.

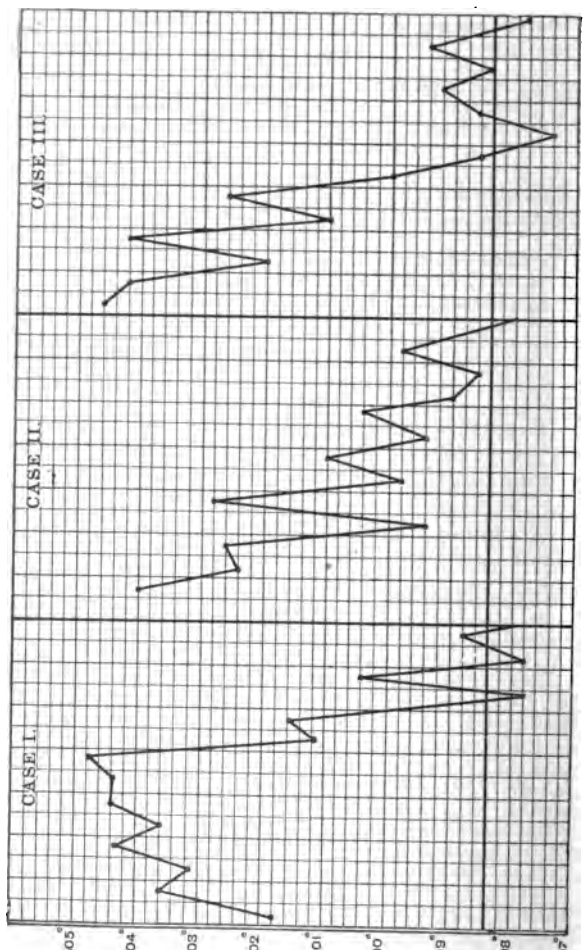


Fig. 16.—Chart of Cases of Acute Lobar Pneumonia.

effervescence, had 1 minim doses of tincture of aconite every three hours for three doses only. House physician's note: "Brought down temperature from 104° to 101°." Convalescence rapid and uninterrupted.

It will be seen that three doses of *tincture of aconite*—1 minim every three hours—were given to case No. 3, and the house physician added this note, "Brought down temperature from 104° to 101°."

We do not advocate the use of aconite *generally* in pneumonia; indeed, we are strongly *opposed* to its continued use as a routine remedy, or to more than a limited number of small doses. But given in small doses to children and young people at the very onset of an attack, and for twelve to twenty-four hours only, we are bound to bear testimony to its remarkably good effects. We have not seen any particularly good results follow its use in adults, and we should consider its administration most unjustifiable in aged people. But it has some subtle influence, which we are quite unable to explain, over many of the febrile affections of children and young people. It allays the distressing sense of heat, it calms restlessness, and it promotes sleep. We give from 1 to 3 minims of the tincture every three or four hours for three to six doses, or one of Schiefflin's pilules of *aconitine*, each containing $\frac{1}{480}$th of a grain. We never give more than six doses; and we restrict its use to the first forty-eight hours of the illness, and we must repeat that it is only in the *young* that we think it of value.

But to return to the question of the administration of *quinine* in pneumonia. Jurgensen,* who is one of the strongest advocates of the use of quinine in this disease, seems to regard it simply as a reducer of temperature. He is a warm advocate of an *antipyretic* treatment of pneumonia, because he considers the *pyrexia* causes cardiac exhaustion, and that failure of heart power is *the* special and particular danger we have to combat. But it is clear that if quinine

* Von Ziemssen's "Cyclopædia of the Practice of Medicine," vol. v., p. 164.

antagonises the activities of an infective organism upon which the *pyrexia* and all the disturbances connected with it depend—and there is as much reason for supposing that quinine acts in this way as in any other—then the value of quinine as an antitoxin must be far greater than that of a *mere* depressor of temperature—as, for instance, the cold bath—for not only, on this hypothesis, does it lower the temperature, but it acts also as a direct antagonist to the toxic agent in the body.

We give in a severe case 3 grains of quinine every three hours—that would amount to 24 grains in twenty-four hours. We have never found the slightest difficulty at any time in assuring the toleration of these doses.

It will be seen that we have brought the use of quinine in pneumonia under the first indication, "to endeavour, if possible, to *antagonise* the *injurious influences* of the *specific infective organism* on the blood and the tissues." We regard its action in pneumonia as *analogous* to its action in ague, and we do not give it, as we have already said, simply as an antipyretic. Finally, we may remark that all physicians are agreed that quinine must be given freely in those forms of pneumonia which arise in association with exposure to malarial influences.

Those who have written against the use of quinine in pneumonia cannot have taken the trouble to employ it in the way we have indicated, and as, in the business of daily life, it is easy to "damn with faint praise," so in therapeutics it is easy to "damn" with careless or *unskilful application*.

Various *antiseptic* agents have been suggested for the cure of pneumonia, with the idea of their exerting a *germicidal* action; such as sodium benzoate, iodine, ethylic iodide, the salicylates, and carbolic acid. We are not aware that any particularly good effects have been obtained from the use of these agents. We should be disposed to place the *inhalation* of *turpentine*, which has been advocated in pneumonia, amongst the

antiseptic agents. Equal parts of turpentine, oil, and glycerine have been mixed with three times as much distilled water, and used as a spray in Lewin's steam atomiser. Such a mixture is inhaled from five to ten minutes five or six times a day. The patient is directed to take, from time to time, five or six very deep inspirations. In the intervals he should breathe in the ordinary way. It is said to stimulate respiration and to exercise a favourable influence on the general course of the disease.

Some ten years ago G. and F. Klemperer stated that when the specific "pneumococcus" enters the body of an animal it generates a poison, which they named "*pneumotoxin*," and that the pneumonic fever depends upon the presence in the blood of this substance: that after a few days another substance, "*anti-pneumotoxin*," is formed, which neutralises the pneumotoxin and arrests the pyrexia. As soon as sufficient anti-pneumotoxin has been produced to neutralise the pneumotoxin the "crisis" takes place. Hence they maintained that animals may be rendered "immune" by the inoculation of any nutrient medium in which the "pneumococcus" has been cultivated. The serum of such an immune animal contains anti-pneumotoxin, and may therefore be used to cure pneumonic intoxication.

On this is founded the "**serum**" treatment of pneumonia, which has been applied in many cases by different observers with somewhat uncertain results. Successful and gratifying results have been reported by some, while a want of success has been reported by others, much as in other methods of treatment of this disease. The serum is obtained by rendering an animal immune to the disease by inoculating it with a gradually increasing dose of the pneumococcus. Bokenham* thus analyses its effects: "The serum does not seem to reduce the duration of the disease, nor to produce a 'crisis,' nor to cut short the pneumonic processes in the lungs. It does apparently

* *British Medical Journal*, October 15th, 1900, p. 1080.

prevent a general septicæmia, and may thus in some cases help to save life. Its mode of action is not bactericidal, as pneumococci will grow readily in it . . but when the serum is combined either with normal leucocytes, or even with dead ones, a mixture is obtained which is capable of changing and shrivelling pneumococci. When therefore pneumococci are injected into an animal which has either been vaccinated or treated with anti-pneumococcus serum, the animal shows immunity because the serum has combined with the 'alexin' contained in its leucocytes. This combination then acts on the microbes, which become shrivelled, and are then cleared away by phagocytes. The chief difficulty in the clinical use of this serum arises from the immense number of bacteria present in the lung exudation, and from the fact that the action of the serum seems limited to preventing the entry of the organisms into the blood vessels."

Further trials on a large scale will certainly be made of this method, and authoritative conclusions arrived at before long. Pane's serum has been the one most generally employed, and the dose is 20 c.c., given hypodermically twice daily, until the patient is convalescent.

We may now pass on to the consideration of the *second indication*, viz.: *To relieve and to endeavour to subdue dangerous and distressing symptoms.*

The first of these we shall consider is **pyrexia** or *hyperpyrexia.*

Jurgensen maintained that the chief end to be aimed at by treatment in pneumonia is the reduction of temperature, as the chief danger is from cardiac asthenia, determined, in part, by the obstruction to the circulation presented by the pulmonary lesion: and that the continuance of the fever is especially dangerous to the force and integrity of the cardiac muscle. Wilson Fox,* however, doubted, and we are disposed to share the doubt, whether the high

* "Diseases of the Lungs," p. 363.

temperature has a greater influence in causing cardiac failure than the action of the specific poison on the nervous system; the state of the pulse may, therefore, be taken as a better guide to treatment than the temperature. Wilson Fox's experience also led him to the conclusion that a temperature up to 105° F. has very little apparent influence on the mortality in pneumonia, and that deaths at a temperature below are nearly as frequent as above 105°; the mortality depending chiefly on age, on complications, or on preceding or co-existing debility, from whatever cause, or from the amount of lung implicated, and especially from the implication of both lungs.

A careful examination of the evidence of the effects of the **cold bath** in the treatment of pneumonia is not so satisfactory as to warrant its general employment or recommendation. For, although the statistics published by some Continental practitioners show fairly good results, it must be borne in mind, as has been pointed out by Wilson Fox, that in some conditions, such as great debility, extent of lung involved, rapidity of respiration, advanced age, and the alcoholic habit, "which must increase the danger from pneumonia, this treatment has been considered inapplicable by those who have most largely employed it," so that it has really been tested chiefly in *selected* cases; and Wilson Fox came to the conclusion that "cold bathing does not diminish the mortality of cases with temperatures above 104° F." He thought the method useful, however, in a few cases of pneumonia in childhood with danger of collapse of adjacent portions of lung. "The effect of the cold bath in advancing cyanosis is of a most markedly beneficial kind. It causes deep inspiration and the refilling of the lung, and may be, occasionally, the means of saving life." He thought, however, an ice-cap, and a spinal ice-bag, in some cases, were often useful in allaying nervous excitement, as well as in lowering temperature and diminishing the rapidity and improving the strength of the pulse; and he also

approved of a water bed through which a stream of cold water is kept constantly flowing.

The cold bath has been found to be dangerous in some cases, and its application has been attended by shock, collapse, and return of rigors.

We are not ourselves partisans of the general or indiscriminate use of the cold bath treatment of pneumonia: its *routine* application to all cases where the temperature is not more than 102° or 103°, as has been advocated, we consider wholly unnecessary and unjustifiable. The arguments that have been used in favour of expectancy, and in opposition to drug or other active treatment, will certainly apply with quite equal force to the routine use of the cold bath.

The *local* application of cold, however, has had a number of advocates. The practice of applying cold to the surface of the chest over the affected lung originated no doubt in the idea that it would influence favourably the local pulmonary lesion, and also relieve the pleuritic pain. But it seems far more probable that it acts as an antipyretic, and influences favourably the course of the pyrexia. Niemeyer was a warm supporter of this mode of treatment, and regarded it as of great value in relieving pain, in lowering somewhat the temperature, and in abbreviating the course of the disease. He used cold compresses to the affected side, which were frequently renewed. The application of an *ice-bag* has been suggested as a great improvement on this method, as it does not need frequent renewal, as the cold compresses do.

There appears to be some risk of chill and collapse if this treatment is applied to feeble children, and the temperature in all cases should be frequently taken during its application. The ice-bag should be removed if it falls below 100°, and it may be reapplied if the temperature rises again to above 102°. The ice-bag should not be applied over the præcordial region, as it is liable to exercise a depressing influence on the heart. If symptoms of cardiac depression

appear, brandy must be given and heat applied to the extremities.

The local application of ice to the chest or to the spine certainly has a powerful influence over the temperature in this disease, and appears to subdue the pyrexia quite as surely as cold baths, while it is much more convenient to apply and far less exhausting to the patient. Dr. Barrs applies ice-bags to the abdomen in this disease.*

Many **drugs** have been advocated to reduce the fever in acute pneumonia; of the use of *aconite* we have already expressed our opinion.

Digitalis is another drug the use of which has been greatly extolled in the treatment of pneumonia, and it has this advantage, that while it reduces the temperature and the pulse-rate, in moderate doses it acts as a tonic to the heart. Niemeyer considered its use indicated whenever the pulse was of great rapidity. Jaccoud approves of its use, and considers its good effect is chiefly confined to lowering the temperature. Prof. Anders † has found nitro-glycerine considerably aid the action of digitalis in cases with cardiac weakness—he gives 10 minims of tincture of digitalis with ½ minim of solution of nitro-glycerine every three or four hours. He considers the latter "especially indicated when the renal secretion is scanty and the urine contains more than the usual trace of albumin."

The great tolerance of digitalis in pneumonia has led to the giving of very large doses. We should recommend that the doses given should not exceed 2 drams to ½ ounce of the infusion, or 10 to 20 minims of the tincture. These doses may be given together with 20 or 30 grains of potassium citrate or sodium tartrate. Wilson Fox refers to the tendency digitalis has to intensify or prolong the great critical fall of temperature, "a result by no means to be desired," and we agree with him that its use should

* *British Medical Journal*, June 16th, 1900, p. 1463.

† "Text-book of the Practice of Medicine" (fourth edition), vol. i., p. 155.

be limited to those cases where at an early period there is remarkable frequency and feebleness of pulse, and in cases where, owing to circulatory feebleness, the expectoration is profuse and bloody. He also advocates its use in alcoholic cases, especially when attended with profuse sweatings; in such cases the "benefit from its use has been of the most marked nature," given together with alcoholic stimulants.

As digitalis is often somewhat slow in its action, it should not be continued for long at a time; its effects must be carefully watched. It should not be given to old people.

In short, digitalis is a drug from which much good may be obtained in the treatment of pneumonia, but its use requires great discrimination.

We are not greatly in favour of the use of modern antipyretic drugs in the treatment of this disease, on account of the cardiac depression they not unfrequently produce. In the pneumonia of children antipyrin has been said to allay restlessness, quiet delirium and cough, and promote sleep, as well as reduce temperature; it has been given in 2- to 6-grain doses every six or eight hours, according to the age of the child.

We prefer *phenacetin* to antipyrin as a depressor of temperature. It has not the same tendency to cause cardiac debility. We have given it with excellent results in quite *small* doses in severe cases of influenzal pneumonia. In one, a very severe form of influenza, the temperature reached 106°. There was extensive pneumonic consolidation of one lung, the lower two-thirds, and congestive hyperæmia, with dulness and œdematous crepitation at the base of the other lung. There was active delirium. The tongue was dry and furred, the respirations 60. The patient —a young woman—was given 1 grain of phenacetin with 1 grain of hydrobromide of quinine every hour for nearly three days, during which the temperature fell, the delirium disappeared, and the lung began to clear and she made a rapid and uninterrupted

recovery. She was watched very carefully for any signs of cardiac depression while she was taking the phenacetin, but no sign of any such effect was observed.

Sodium salicylate has been advocated by some as of value in the pyrexial stage of pneumonia. It is, in our opinion, too depressing a drug to be used in this disease.

Pain, which is due to accompanying pleuritis, is a symptom we should do our best to relieve, for not only does it tend to exhaust the patient by preventing sleep and causing restlessness, but it aggravates the dyspnœa by inducing the patient to make very shallow inspirations for fear of increasing the pain. The application to the painful side of three to six leeches, followed by a hot linseed poultice sprinkled with laudanum, is one of the best remedies. At night 10 grains of Dover's powder in a draught with 3 drams of solution of acetate of ammonia, and 1 ounce of camphor water, is also useful. This is safer than a hypodermic injection of morphine, for in some cases morphine will cause great cardiac depression, and it must, therefore, on no account be given to feeble and aged patients. A combination of a small dose of morphine with one of strychnine, or with a small dose of nitro-glycerine, has been suggested as safer than morphine alone. Ice-bags and ice-poultices, together with the application of strapping to the chest, have been found effectual also in relieving pain.

Dyspnœa, when it occurs in an aggravated form, with extremely rapid, shallow respirations, and accompanied by cyanosis, is one of the most serious symptoms we have to combat in pneumonia. It is usually dependent on the rapid extension of the pneumonic exudation, so that a large tract of lung becomes infiltrated and rendered useless for respiration. Owing to the obstruction this also offers to the circulation through the lung, the right side of the heart becomes distended, and the pulse small, weak, and rapid. In more advanced stages of the disease

collateral congestion and œdema of the lung may have more to do with the causation of the dyspnœa than the extent of pneumonic infiltration. There is also a nervous form of dyspnœa, due it is believed to an intense action of the blood-poison on the nervous system, and characterised by extremely rapid respirations, and by the absence of the marked cyanosis which accompanies the preceding form.

In the first of these forms of dyspnœa *blood-letting* is indicated, in order to afford immediate relief to the over-distended right heart. From 4 to 10 ounces of blood should be withdrawn from a vein in the arm; in feeble persons not more than 4 ounces, in the robust 8 or 10 ounces. This measure usually affords temporary relief, and so time is gained for the application of other remedies, and this, indeed, is the chief value of venesection; for its remedial effect is often brief, and if it be repeated frequently it will compromise the patient's chances of recovery by directly contributing to cardiac asthenia. Stimulants, therefore, must at the same time be given, and ammonium carbonate, ether, and digitalis to maintain the cardiac action.

We have said nothing as to the propriety of bleeding in the early stage of this disease, which was at one time so common. It is but rarely that we see a case in which it is indicated, but we agree with Osler,* who says it is "good practice at the very outset in robust, healthy individuals in whom the disease sets in with great intensity and high fever." In such cases it relieves pain and dyspnœa, reduces temperature, and allays cerebral excitement.

The *hypodermic injection of strychnine* is a valuable resource in these cases of grave dyspnœa with struggling cardiac action; from $\frac{1}{64}$th to $\frac{1}{32}$nd of a grain may be given at intervals of an hour for three or four doses. *Inhalation of oxygen* has also been found of great value in maintaining life under such conditions, but it should be *continuous*, for even after

* "Practice of Medicine" (fourth edition), p. 135.

it has caused a complete rally, and the danger seems to have been overcome, the dyspnœa and cyanosis are apt to quickly return on the discontinuance of the inhalation of the gas. Its use has been continued for four days and nights by one practitioner, and for 106 hours by another; in the latter instance an average of 200 gallons of the gas was consumed in twenty-four hours.

The inhalation of oxygen might often be employed earlier in the course of the disease than it now is with advantage—its application should be begun whenever feebleness and irregularity of pulse and blueness of the lips indicate increasing feebleness and distension of the right ventricle.

Dry-cupping has been found useful by some physicians. Wilson Fox thought dyspnœa in children was best treated by the cold bath, as we have already stated.

The *nervous* form of dyspnœa may be relieved by morphine and ether; $\frac{1}{6}$th of a grain of acetate of morphine and $\frac{1}{2}$ dram of spirits of ether may be given in peppermint water, and repeated if needful; or $\frac{1}{6}$th of a grain of morphine may be injected hypodermically.

We must, however, be *quite sure* that the dyspnœa *is nervous*, as it would be a serious error to give morphine if the dyspnœa were due to respiratory obstruction.

Delirium, when it occurs early, as it is apt to do in the course of pneumonia, is usually dependent on the intensity of the fever, and on the severity of the action of the fever poison on the nervous system. At this period it is best dealt with by such means as reduce the pyrexia, and these we have already detailed; an ice-cap to the head, or an ice-bag to the spine, or the local or general application of cold, or the use of the antipyretics referred to above. But when the delirium depends on a special excitability of the nervous system, or on exhaustion, at a late stage of the disease, some special means must be adopted for its relief. *Musk* was a favourite remedy

with Trousseau for this symptom, given in 5-grain doses, and Professor H. C. Wood has also advocated its use given in 10- to 15-grain doses, by rectal injection, suspended in mucilage, every six hours. A more trustworthy remedy is a combination of chloral and bromide of potassium; 20 grains of the former and 30 grains of the latter drug should be given at once, dissolved in an ounce of camphor water, and repeated when necessary. Douglas Powell has recommended, for violent delirium at this period, frequently-repeated doses of alcohol, given with some fluid food, and followed by a hypodermic injection of morphine and atropine.

Sleeplessness may precede and accompany the delirium, and requires similar management; but when it is dependent on *pain*, *cough*, *dyspnœa*, or *exhaustion*, it can, obviously, only be relieved by remedies which relieve these other symptoms and states. The surroundings of the patient should, of course, be such as tend to promote sleep: a quiet, cool, well-ventilated room, a comfortable bed, etc.

Cough is a symptom which, when frequent and distressing, requires treatment. So long as the cough is attended by expectoration of the peculiar pneumonic sputum, or of frothy mucus from co-existing bronchial catarrh, it would obviously be mischievous to give sedatives to arrest it. Such a cough is essential and useful for clearing the air-passages of obstructive secretion. But it sometimes happens that there is much and distressing irritative cough, unattended by expectoration; this may be due to the extreme viscidity and tenacity of the sputa, and the consequent difficulty in detaching them and expelling them from the air-passages, or it may depend on some laryngeal irritation which may be the seat of a coincident dry catarrh. A cough of this kind, if left unrelieved, will add greatly to the patient's distress and exhaustion, as it will prevent sleep, and the mere muscular efforts of ineffectual coughing are most exhausting. If the cough is due to the difficulty of

expelling dry viscid sputum, then warm alkaline sprays (Ems, or Vichy, or Bourboule water is suitable) will be found most useful. The following is a very good formula :—

℞ Sodii bicarbonatis gr. x.
Sodii chloridi gr. v.
Glycerini acidi carbolici ℥ss.
Aquæ laurocerasi ℥ij.
Aquæ ad ℥j.
Misce. To be used as a spray.

This should be applied hot in a Seigle's steam spray-producer. At the same time the patient should be given an occasional drink of alkaline water (Ems, Vichy), mixed with a little hot milk and a teaspoonful or two of brandy or whisky, or a mixture containing ammonium carbonate and spirits of chloroform may promote expectoration. If this fails to relieve, and the cough seems due to laryngeal irritation, from 2 to 5 grains of Dover's powder mixed with a little chloroform water may be given occasionally; small doses of tartar emetic are often extremely useful in allaying this symptom. A teaspoonful occasionally of the following linctus will rarely fail to relieve such a cough :—

℞ Vini antimonialis ℥ij.
Ammonii carbonatis gr. xviij.
Liquoris morphinæ hydrochloridi ... ℥j.
Aquæ laurocerasi ℥iv.
Syrupi simplicis ad ℥jss.
Misce, fiat linctus. One teaspoonful for a dose.

Gastric catarrh of an acute form and **diarrhœa** are apt occasionally to occur in some cases of acute pneumonia, which for this reason have been termed cases of *bilious pneumonia*. These symptoms are not unfrequently induced by injudicious feeding; by an over-anxiety to give food when the stomach is not in a state to digest it, when the tongue is thickly coated, and the mouth foul and covered with a dryish, sticky secretion. On percussion of the stomach it will often be found to be

dilated from indiscreet over-feeding with food that cannot be absorbed. Vomiting will occur in such circumstances, and sometimes diarrhœa. To prevent these symptoms it is a good plan, if we see the case early, to give, at the very onset, a grain or two of calomel followed by a saline aperient, so as to sweep away any foul, irritating substances that may be retained in the alimentary canal; or the same remedy may be applied when the symptoms of gastric catarrh present themselves. The food should be restricted to milk diluted with an equal quantity of water, and containing 10 or 15 grains of bicarbonate of soda to each cupful. A little water arrowroot with a small quantity of brandy may also be occasionally given. A mustard plaster to the epigastrium will relieve the tendency to vomiting. It will rarely be necessary to have recourse to any other means than these to relieve the gastric catarrh and arrest the *diarrhœa*. If the latter symptom, however, should be troublesome, it can usually be controlled by a few doses of Dover's powder (2 to 5 grains) with bismuth subnitrate (5 to 10 grains).

We now reach the third indication, "*To support the patient's strength, and to endeavour to remove or moderate all conditions tending to exhaustion.*" Some of the means at our disposal for responding to this indication have already been considered in the preceding remarks on the treatment of symptoms.

It is generally admitted that the great danger to life in pneumonia is the tendency to **cardiac failure**, and it is to prevent this, in the last stage of the disease, that all our efforts must be directed.

It is hardly necessary to point out that the patient should be kept absolutely at rest in a comfortable bed in an airy, well-ventilated room, and as quiet as possible. He should not be disturbed unnecessarily, or moved about and exhausted by too frequent physical examination. His diet should be fluid and light, and adapted to the enfeebled digestive powers, and to the febrile state. Milk, diluted with

water, or some effervescing alkaline water when there is any tendency to sickness, is a good and convenient food. The occasional vomiting of *coagulated* milk should be carefully noted, for it then usually requires further dilution with some alkaline water, or it should be peptonised. Light clear soups and broths may also be given; there is no harm in a cup of well-made tea or coffee now and then, and they are both cardiac stimulants. Strong coffee is too little used in these cases. It has a tonic effect on the heart. Thirst may be allayed, and the mouth kept clean and moist, by sipping iced lemonade, toast and water, or barley water, according to choice.

When more stimulating food seems called for, eggs may be given beaten up with boiling water, which partially cooks them, and one or two dessertspoonfuls of brandy or whisky added. Strong beef-tea, or meat juice and arrowroot may also be given with some added spirit in the same way. If there is co-existent bronchial catarrh, and the expectoration is viscid and difficult of expulsion, hot milk and seltzer water in equal parts, with two or three teaspoonfuls of brandy, serve both as a stimulating food and a useful expectorant.

With regard to the use of **alcoholic stimulants**, we are convinced that in more than two-thirds of the cases of acute pneumonia, as they are generally encountered, there is no need for them whatever. The routine administration of alcohol in pneumonias especially in the early stages, with the idea of preventing cardiac failure later, is, we think, a *seriou, error*. Alcohol produces vaso-motor *paresis*, and causes dilatation of the vessels, and it must, therefore, aggravate or induce tendencies to vascular engorgement. It acts like a poison on many persons, and causes considerable nervous and general depression after its first stimulating effect passes off; it increases the amount of toxic substances in the blood, and the elimination of considerable quantities of alcohol must impose a severe strain on the already overtaxed organs

of excretion. When we further consider the large quantity of *impure* spirit—brandy and whisky—which must be used in hospital practice, for the pure and best kinds are very costly, we are disposed to believe that some of the more serious forms of cardiac failure, with albuminuria and gastric and hepatic congestion, encountered in the later stage of pneumonia, are, to a certain extent, contributed to by the excessive and premature use of impure alcohol.

The *early* routine use of alcohol takes from us also the power of resorting to it as a fresh resource in advanced stages, when in exceptional cases it may be of undoubted use.

The very same objection that has been made to inferring from results as to the value of any particular remedy in a disease like pneumonia, with so strong a tendency to terminate in a rapid crisis and complete recovery, must apply with equal force to the inferences that have been drawn from the routine use of alcohol In well-marked adynamic cases, however, the use of alcohol is indicated, and we should make some efforts to obtain it pure. In the pneumonia of drunkards, and of the aged, it is especially needed. We should begin with moderate amounts—4 to 6 ounces of whisky or brandy in twenty-four hours—and increase them if necessary. Dr. Wilson Fox thus formulated the indications for its use: "rapidity, irregularity, intermittence, and dicrotism of pulse, great rapidity of respiration, cyanosis, with a rapid, feeble pulse, irregularity of breathing, and signs of pulmonary œdema, tremor, subsultus, muttering delirium, or delirium in patients addicted to alcoholism, and profuse sweating during the febrile period, are all indications for alcohol. When these symptoms are severe alcohol must occasionally be used unflinchingly and unsparingly."*

A moderate amount of alcoholic stimulant in the form of good, sound wine, such as port or burgundy, or champagne if it is preferred, or 2 or 3 ounces of

* "Diseases of the Lungs," p. 372.

whisky or brandy in the day, is often needed after the crisis, and during convalescence. It will then be of much help in restoring the strength of the patient.

Cardiac failure may arise in two ways: either, owing to the extent of the pneumonic consolidation of the lung, and the obstruction to the circulation in the pulmonary vessels and the venous system generally, so produced, the right side of the heart becomes over-distended, and there is a tendency to clotting in the right heart and arrest in diastole; or, owing to the intensity of the septic infection and the pyrexia, there is a *general* loss of cardiac power, with well-marked nervous disturbance, and great *general* prostration. We have already alluded to the possible usefulness of *venesection* when the first form of cardiac failure is seen to be impending; the great objection to its employment, except in vigorous persons, and in small amount, is that if it fails to help the struggling heart over the critical period it may leave the patient in a worse condition to fight through the final stages of the disease than before. With this exception, the treatment of both forms of cardiac failure is the same.

Hypodermic injections of ether to stimulate the heart in these grave cases of adynamic pneumonia, 20 to 30 minims, quickly repeated if necessary, have been found a valuable resource in many instances. Huchard combines injections of *caffeine* with injections of ether. He believes the former to be purely tonic to the heart, and the latter only stimulating. He dissolves the caffeine in distilled water with the aid of sodium salicylate—a dram of caffeine and 45 grains of sodium salicylate are dissolved in 1½ dram of warm distilled water—one-tenth of this, containing 6 grains of caffeine, is injected at a time, and may be repeated six or eight times in twenty-four hours.

Professor von Koranyi,* of Buda-Pesth, has advocated the use of saline intravenous injections to

* *British Medical Journal*, April 28th, 1900, p. 1055.

assist the heart and promote diuresis, and Professor Anders * thinks that saline injections given hypodermically are "valuable in overcoming circulatory depression, which is often threatening to life." He recommends that 1 to 2 pints should be allowed to flow under the skin from a rubber bag, and repeated, if necessary, at intervals of eight to twelve hours.

Some consider that means for *disinfection* should be applied in cases of pneumonia, more especially in its epidemic forms; the linen should be treated as in other infectious diseases, and the sputa should be destroyed. As it seems possible that the germs may linger in the mouth in a state of activity, this cavity should be disinfected by means of antiseptic mouth washes; this would lessen the danger of relapse and the risk of infecting others. A tablespoonful of *Listerine* in a wineglassful of warm water would answer the purpose.

Convalescence from acute pneumonia is often rapid and uninterrupted; at other times, especially if the acute period has been prolonged, and the *crisis* late, or if the pyrexia has terminated gradually and not by crisis, the convalescence may be protracted, and requires care and watching. A light, sustaining diet, with a moderate amount of wine or other stimulant will be needed, as well as quinine, strychnine, and iron as tonics, and a slow disappearance of the lung infiltration may require the application of a few flying blisters or iodine paint over the area of dulness. We have found such counter-irritation promote the disappearance of the exudation: indeed, we regard this as the special use of counter-irritation, and in ordinary cases we reserve its application for this stage of the disease. In strumous cases we have seen iodide of iron in combination with cod-liver oil of much use in quickening the disappearance of the exudation, and the complete clearing up of the lung. It will often, however, be necessary to have recourse

* "Text-book of the Practice of Medicine" (fourth edition), vol. i., p. 155.

to change of air, to removal to the seaside or to some bracing mountain resort, to completely restore the affected lung to a healthy condition.

II.—Catarrhal, Lobular, or Broncho-Pneumonia.

Cases of this form of pneumonia differ in many respects from the preceding—in their mode of origin, in their course and termination, in their anatomical lesions, and in their symptoms and physical signs.

The **indications** for **treatment** will also differ somewhat.

These cases usually *originate* in a pre-existing bronchitis, the inflammation of the bronchioles extending to the contiguous air-cells, and they are, therefore, **caused** by the same conditions as induce bronchitis; and these we have already considered. They are, however, very prone to occur in those forms of bronchitis which accompany the infective fevers, such as measles, whooping-cough, influenza, diphtheria, etc., and especially when these diseases attack children, or others who are living in unfavourable hygienic conditions.

Various organisms have been found in the lungs in broncho-pneumonia, but it is scarcely possible to say at present whether or not they are causally connected with this disease. Streptococci, staphylococci, the micrococcus lanceolatus, and the pneumococcus of Friedländer have all been found. These organisms are commonly present in the oro-nasal cavities, and under certain circumstances and conditions of the air-passages they may be drawn by inhalation into the air-cells.

Attacks of broncho-pneumonia are very common in *early childhood*, but they are not so generally restricted to that period as has been thought. In epidemics of influenza they occur at all ages, and they are common in old age and in debilitated states. The existence of heart disease and pulmonary emphysema favour their occurrence. Constitutional syphilis, scrofula, and rachitis in children predispose to these attacks.

They *differ in their course* from croupous pneumonia; the invasion is usually gradual, being preceded by the ordinary signs of bronchitis. They run no definite cyclical or typical course, as do cases of lobar pneumonia; their course is variable and irregular, sometimes terminating fatally in a few days, sometimes lasting many weeks, and ending in a slow and gradual convalescence. The mortality is much greater.

They differ in the characteristic *anatomical lesions*, and their distribution. The inflammation, creeping on from the bronchioles, affects scattered groups of lobules, hence the name *lobular;* these, however, may coalesce, and so considerable tracts of lung tissue may be affected. This becomes associated, to a greater or less extent, with collapse of other lobules, an important lesion the mode of occurrence of which we need not now stay to explain. But these collapsed air-cells are apt themselves to become the seat of pneumonia. The *exudation* into the air-cells differs also from that of croupous pneumonia in being composed chiefly of epithelial cells, and the cells of catarrhal bronchitic exudation drawn into them during inspiration, together with leucocytes, a few red blood corpuscles, and only a scanty proportion of fibrin. The bronchial tubes are prone to undergo dilatation, especially small globular dilatation of the fine tubes. These *scattered* lesions usually affect *both* lungs, so that the disease is commonly bilateral. The bronchial glands are usually affected, and become inflamed and swollen.

The secondary lesions, such as dilatation of the right side of the heart, and congestion of the liver, stomach, and kidneys, depend on the obstruction to the pulmonary circulation.

The attacks differ in their *symptoms* and *physical* signs; these are, of course, to some extent, those of the accompanying and antecedent bronchitis, and they vary greatly in their severity, according to the extent and intensity of the local inflammation or the attendant constitutional state. The *cough* is usually an

important and troublesome symptom, and is apt to occur in severe suffocative paroxysms. The *dyspnœa* may be very great, and the respirations very rapid, rising even to 100 in the minute, according to the amount of obstruction to the access of air to the air-cells. The expiration is usually prolonged and laboured. The *sputa* are bronchitic or puriform, not rusty; they are very tenacious, and young children rarely expectorate them.

The *fever* is somewhat irregular; at first the temperature may be that of acute bronchitis, or of the infective disease of which it is a complication, and may not exceed 102° to 103°. Subsequently it may rise to 104° or 105°, and there are often considerable daily fluctuations. The defervescence is gradual, and not by crisis. When the temperature is high, and the respirations are rapid, the pulse is also very quick, and usually small and feeble, and may reach 160 to 200; the face is cyanosed. In severe cases there is also marked tendency to *gastro-intestinal catarrh*, with great thirst, a brown and dry tongue, and *diarrhœa*, and there is likewise a great tendency to cerebral disturbance, restlessness, delirium, convulsions, stupor, and coma.

In cases that recover the convalescence is not so rapid as in lobar pneumonia, nor is it often so complete. Recovery is gradual, and there is a certain tendency to the sequence of chronic pulmonary disease, or the development of rachitis, or the occurrence of gastro-intestinal irritation.

The *physical signs* differ from those of croupous pneumonia. There are, of course, those of the co-existing bronchitis — viz., sonorous and sibilant, dry and moist *râles* heard over the greater part of the chest; and there may also be the signs due to catarrhal obstruction of the air-passages, and attendant collapse and emphysema, viz. immobility of the chest, and sinking in of the lower ribs.

But the physical signs dependent on the onset of

this form of pneumonia are somewhat obscure, unless considerable areas of lung near the surface are involved. If the pneumonic spots are small in extent and surrounded by healthy lung, they will yield no characteristic signs to percussion or auscultation. The portions of lung, however, most liable to pulmonary collapse extend from the base upwards, in a somewhat conical form, along each side of the spine, and here gentle percussion may show the presence of dulness on both sides. Fine subcrepitant *râles* may also be heard over the dull areas with blowing expiration. The physical signs, however, of pulmonary consolidation are usually much less evident than in cases of croupous pneumonia, but careful and skilful percussion and auscultation will usually detect in some part of the chest the signs of spots of pneumonic infiltration.

From this brief sketch of the character and course of **broncho-pneumonia,** we may be assisted in formulating *indications for its* **treatment.**

The first of these is *to promote the removal of obstructions in the air-passages*, and so *favour lung expansion* and prevent the *extension of lung collapse.*

The second is *to relieve distressing and exhausting symptoms*, such as *cough, dyspnœa, fever, diarrhœa, cerebral irritation, etc.*

The third is *to support the strength of the patient*, and ward off debility and exhaustion by every possible means.

Obviously the remedies which will respond to the first indication will, to some extent, aid in the second, and those which answer to the first and second will further the third.

The first thing that will strike any observant practitioner in the care of cases of broncho-pneumonia is the desirability of the application of remedies that will promote the expulsion from the air-passages of the tenacious, adherent mucous secretion that is obstructing them. The whole series of morbid

phenomena observed in these cases follow from this obstruction of the air-tubes.

Emetics have been recommended for this purpose, and especially ipecacuanha, to promote the expulsion of the mucus that accumulates and obstructs the air-passages, and an occasional emetic of 10 to 20 grains of ipecacuanha powder, mixed with a little warm water and syrup, may with advantage be administered. The effect of the emetic is to relieve dyspnœa, to lessen cyanosis, and to prevent the tendency to collapse.

The hypodermic injection of *apomorphine* ($\frac{1}{12}$ grain for adults, $\frac{1}{30}$ for children) has been used and commended for this purpose, but it has been found to be occasionally attended with such very depressing effects that it cannot be safely recommended for general application.

The drawback to the use of emetics is that they cannot be frequently repeated without producing much exhaustion, and that they are apt to excite gastric irritation, to which there is a distinct predisposition in these cases. We have found another expedient most useful in promoting the expulsion of the mucus from the air-passages, and in lessening its viscidity. It is the use of *benzoate of soda* internally, and the frequent application of warm *alkaline sprays* containing some *glycerine of carbolic acid.* In those cases occurring in connection with infective diseases the benefit attending this method of treatment will often be found remarkable, while it is a therapeutic method absolutely free from any possible objection.

From 5 to 20 grains of benzoate of soda, according to the age of the patient, with 1 to 4 drams of chloroform water, should be given every two or three hours, and a warm spray composed of 10 to 15 grains of bicarbonate of soda and 1 dram of glycerine of carbolic acid to each ounce of water should be freely sprayed in front of the mouth and nose of the child (when it is too young to inhale voluntarily), so as to be inhaled with the respired air.

This can easily be arranged by mounting a good-sized Seigle's steam spray-producer at a suitable level, and allowing the steam spray to flow under the hood of the child's cot or to play freely in front of its mouth and nose. (*See* Fig. 2, vol. ii., p. 591.) It is desirable in these cases that a flannel tent should surround the child's cot or bed, so as to shut in this warm, moist atmosphere, rendered additionally so if necessary by a steam kettle. The increased fluidity which such an atmosphere gives to the bronchitic secretion is of the greatest importance in promoting its expulsion. Warm saline drinks serve the same purpose, and the patient should be made to drink frequently a small quantity of hot milk mixed with about twice as much seltzer or Apollinaris water, to which a little whisky or brandy should be added, from ten drops to one or two teaspoonfuls, according to the age and condition of the patient. These measures afford relief also to the *cough*, the distressing paroxysms of which are caused by the violent expiratory efforts to expel the tenacious mucus adhering to the air-tubes and obstructing respiration. As these violent expiratory efforts tend to cause pulmonary collapse, it is important they should be moderated and controlled, and if the measures just described do not sufficiently control the cough, some sedative must be cautiously administered for the purpose. The greatest caution must, however, be exercised in the use of opiates, lest they should by any means interfere with expectoration, and so add still further to the respiratory obstruction. This may best be obviated by giving very small doses, and combining them with expectorants and stimulants. One great advantage, which can scarcely be over-estimated, attending the occasional administration of minute doses of opium, is the relief it usually affords to the restlessness and nervous disturbance. Dover's powder in doses varying from $\frac{1}{4}$ to $1\frac{1}{2}$ grain may be given to children from 3 months to 5 years of age, with $\frac{1}{2}$ grain to 2 grains of ammonium carbonate, and

a little syrup and water, once or twice in the twenty-four hours.

In older people, and in more chronic cases, the ordinary expectorant remedies may be prescribed, but we have found them of little use in young children who do not know how to expectorate. A useful form for adults is carbonate of ammonia, 5 grains; chloride of ammonium, 10 grains; ipecacuanha wine, 5 minims; and infusion of senega, 1 ounce. This dose may be given three or four times a day.

Stimulating embrocations (the compound camphor, mustard, or turpentine liniments) to the chest are useful. We think well also of turpentine inhalation, and a ready and convenient method of applying it in the case of young children is to pour twenty or thirty drops of spirits of turpentine on a piece of lint tied loosely round the child's neck. A quilted cotton-wool jacket should be worn over the chest, and this we consider preferable to hot poultices, as the jacket admits of the application of liniments, or mustard, or iodine, whereas the wet poultice often gets cold, fatigues by its weight, leads to dangerous exposure in its renewal, and, if unskilfully made or applied, often slips and makes the patient damp and uncomfortable. However, the early application of a mustard plaster over the bases of the lungs has often proved useful, and if there is pleuritic pain a hot linseed poultice will usually relieve it.

In the **initial** stage, if there is much fever, with a hot, burning skin, a few small doses of tincture of aconite, $\frac{1}{2}$ a minim to 2 minims according to the age of the child, every hour or two for three or four doses, with a little acetate of ammonia or citrate of potash, will often allay the fever in a remarkable way, and soothe the little patient greatly. Its use must be limited, however, exclusively to the early stage of the disease. We have not found quinine so invariably useful in this form of pneumonia as in the preceding, but most other authorities speak highly of its beneficial effects in some cases. Wilson Fox commends the

administration of quinine, but rather as a tonic than as an antipyretic.*

But one of the most approved methods of treating the pyrexia of catarrhal pneumonia is by the application of **cold**, either in the form of the cold bath or by local application to the chest. This treatment, advocated by Jurgensen, Bartels, Ziemssen, and many others, found a warm supporter in the late Dr. Wilson Fox. In serious febrile cases, with increasing cyanosis and dyspnœa, "immersion for a period of one to three minutes in a bath of a temperature of 65° to 70° Fahr. will," he says, "induce deeper inspiration, and apparently, as I have repeatedly witnessed, restore the vitality of the patient. . . Any prolonged immersion is undesirable in young children, though with recurring cyanosis the baths may be repeated." He also approved of the local application of cold by means of cloths wrung out in cold water and applied to the chest and back, or the ice-bag in the manner already described; and observes of this method, "It appears to operate favourably in two directions—both by increasing the strength and depth and by lessening the frequency of the respiration, and also by the reduction which it effects in the temperature, a result which appears unattainable by any other agent, at least in an equal degree." It is of special value in promoting expansion of the lung, and warding off the danger of increasing collapse.

The reduction of temperature brought about by this method is often very considerable, but it is not permanent, for after a few hours the temperature rises again if the application of cold be intermitted, and several days of this treatment may be needed before a permanent reduction to normal is induced. The pulse- and respiration-rate also fall, and the cyanosis diminishes. But this method is not without risk, and has to be watched carefully, for some patients are far more sensitive to the depressing effect of cold applications than others, and the long-continued

* "Diseases of the Lungs," p. 400.

application of cold has been observed to be followed by very serious symptoms of depression. When any signs of such depression are observed, such as pallor of the countenance, coldness of the surface, a small and very feeble pulse, the application of cold must at once be interrupted and stimulants freely given.

We prefer the method of **cold affusion**—the dashing of cold water over the chest and spine—to that of immersion in the bath. The stimulating effect is greater, and it provokes, more completely, those fuller inspirations which are desired to overcome the danger of collapse. The lower part of the body may be immersed in hot water or hot mustard and water while these cold affusions are applied to the chest.

Leeches to the chest followed by poultices have been advocated by some physicians to relieve the dyspnœa attendant on pulmonary engorgement. We have not seen occasion to adopt this recommendation, nor can we advise it.

Any symptoms of *gastro-intestinal catarrh*, such as *vomiting* and *diarrhœa*, occurring in the course of the illness, must be promptly relieved, because of their lowering tendency. If vomiting occurs early in the case, with a furred tongue and confined bowels, two or three small doses of calomel may be given with advantage—a $\frac{1}{4}$ or $\frac{1}{2}$ a grain, with 2 to 5 grains of bicarbonate of soda, every four or five hours until the bowels have been freely moved. If there is also a tendency to diarrhœa, one or two of these powders may still be given; but should the diarrhœa continue, it will be necessary to replace them by others, each containing Dover's powder, $\frac{1}{2}$ to 2 grains, according to the age of the child, with 2 to 4 grains of carbonate of bismuth, to be given twice daily until the diarrhœa ceases. Symptoms referrible to the *nervous system* — restlessness, delirium, etc. — may be so severe as to require treatment by sedatives. We have already spoken of the use of opium, and the caution necessary in its administration. Given, as already directed, in minimum doses and in

combination with ammonia and ether, it is often valuable in allaying those nervous symptoms. Professor Pepper has found the following suppositories valuable in allaying extreme restlessness and sleeplessness: Asafœtida powdered 1 dram, sulphate of quinine 30 grains; to be made into twelve suppositories with oil of theobroma, one to be introduced every three or four hours. He also recommends chloral hydrate in the form of enema, 5 grains for a child five years of age, and 20 grains for an adult. He says it affords great relief to the nervous symptoms. Active and restless *delirium* in the adult he has found quieted by hypodermic injections of *hyoscyamine*, $\frac{1}{60}$th to $\frac{1}{100}$th of a grain. Enemata of chloral and sodium bromide, 5 to 20 grains of each, according to age, may also be used for the relief of this symptom. Professor H. C. Wood uses enemata of musk suspended in mucilage.

But the most imperative indication in the more serious forms of this disease is to *energetically support the strength* of the patient and to overcome the tendency to respiratory failure. In addition to the measures already pointed out, there are still other means to which we may have recourse. Strychnine, as a stimulant to the respiratory centre and to the respiratory muscles, is a valuable remedy in these cases. It may be given in combination with bark, thus:

℞ Strychninæ	gr.	¼.
Acidi hydrochlorici diluti	ʒj.	
Spiritus chloroformi	ʒiv.	
Extracti cinchonæ liquidi	ʒiij.	
Aquæ	ad ʒiv.	

Misce, fiat mistura. For a child five years of age a teaspoonful (=$\frac{1}{128}$ grain) may be given, in one or two of water, every three or four hours.

In urgent cases larger doses may be given, and preferably by hypodermic injection, so as to ensure a speedy effect.

Inhalation of oxygen may be administered with good effect when signs of asphyxia appear, but to be effectual it must be given long and continuously.

As cardiac stimulants, *ether* and *caffeine* may be given hypodermically, as already mentioned in treating of lobar pneumonia.

Alcoholic stimulation will be needed in most cases to prevent prostration and maintain the strength. In very young children 10 or 15 drops of brandy or whisky may be given in a few teaspoonfuls of hot milk and water every hour, and this dose may be increased to half a teaspoonful or a teaspoonful for older children. When collapse is threatened, brandy or whisky may be given hypodermically, or, mixed with some fluid food, by the rectum.

The general hygienic surroundings of the patient must be carefully attended to. The air of the sick room must be raised to a temperature of between 65° and 70°, and whilst good ventilation is provided, all cold currents of air must be excluded. The diffusion of the vapour of water through the room by means of a steam-kettle should be steadily maintained; and by introducing a small piece of sponge or a roll of blotting-paper moistened with pinol or eucalyptol into the spout of the kettle, an agreeable and useful atmosphere for the patient is produced.

The food must be light and nourishing; good broths, beef tea, gruel, milk, whipped eggs with milk, or whey may be given. If there should be much gastric irritability, or difficulty in swallowing, from great dyspnœa, nutrient enemata must be administered.

The period of **convalescence** must be carefully watched, and tendencies to relapse guarded against.

In the cold and changeable seasons of the year it may be necessary to insist on keeping the house, choosing, if possible, a warm, airy, cheerful, and sunny apartment. To promote resolution of the infiltration, the application of iodine paint, or friction with liniments containing pine oil and iodine, may be found of service. Tonics will be needed to strengthen the circulation and restore loss of power, and help in throwing off the lingering catarrh. One of the best for this

purpose is the *hypophosphite of lime* combined with quinine, iron, and strychnine. Arsenic is very useful in some cases, and the arsenical water of La Bourboule we have found particularly valuable, given night and morning in doses of four to eight tablespoonfuls with a little hot milk. Cod-liver oil is most useful in all strumous cases and in cases of defective nutrition. In summer, change to the *seaside* and cautious bathing with sea-water greatly favours complete recovery, and in older children *mountain air* is often of very great service, promoting as it does a sort of pulmonary gymnastic, and leading to more complete expansion of the lung. It tends to favour the disappearance of residual deposits and to promote the re-expansion of collapsed portions of lung.

III.—Secondary Pneumonias.

These are apt to occur in the course of the acute fevers and in the last stage of many chronic diseases. These are not *true* pneumonias, but are either "hypostatic" and dependent on passive hyperæmia and collapse, or they are local inflammations, set up probably by the morbid, infective state of the blood associated with the original disease.

There is little to be said with regard to their *treatment*, which must necessarily depend greatly on the nature of the disease of which they are complications. They are usually associated with a tendency to cardiac failure, and all those measures of active stimulation which we have described as appropriate to the final stages of the two forms of pneumonia already considered will ordinarily be applicable also here. At the onset of such congestive conditions, warm mustard and linseed poultices are often useful, or hot flannels sprinkled with turpentine. Ether, ammonia, bark, strychnine, alcohol, will be found useful in most cases, administered according to the directions already laid down. Digitalis may also be useful in some instances. But it would be unscientific to attempt to dictate the treatment of one

of those secondary pneumonias, apart from that of the co-existing original disease.

Gangrene of the lung.—It happens but rarely that, as a result of pneumonia, a portion of the lung tissue sloughs, and this is evidenced by the expectoration of intensely fœtid sputum and the presence of a horribly fœtid odour of the breath. Gangrene may also occur from the lodgment of septic emboli in the lung, or from other septic or mechanical injury to it. The object of **treatment,** in such cases, in addition to supporting the patient's strength by suitable stimulants, food, and tonics, is to disinfect and deodorise the sputum and the respired air. The local use of disinfectants (vapours and sprays) and the internal administration of antiseptics, which may be eliminated at the pulmonary surface, are the remedial measures to be adopted. Nothing is so suitable as the continuous wearing of the open zinc respirator figured at page 545. The sponge in it should be kept saturated with eucalyptol, or creasote, or turpentine, or terebene, or a solution of carbolic acid with camphor or iodine in spirits of chloroform. The patient should also be made to inhale freely, from a steam spray-producer, a spray of a 2 to 5 per cent. solution of carbolic acid twice a day, so as to disinfect more completely the air-passages; oxygen inhalations have proved useful. The vapour of turpentine or eucalyptol should also be diffused freely through the patient's apartment. Internally capsules of creasote (1 to 3 minims) or turpentine (5 to 10 minims), or emulsions of these antiseptics in combination with quinine, strychnine, iron, and other tonics should be given several times a day. Surgical operation with the view of draining the gangrenous cavity or area will usually be advisable.*

* *See* Fowler and Godley's "Diseases of the Lungs," p. 418.

ADDITIONAL FORMULÆ.

Digitalis and ipecacuanha mixture for pneumonia.

℞ Digitalis pulveris } āā gr.
Ipecacuanhæ pulveris } xij.
Aquæ, ʒvj.
(Make an infusion, and add)
Aquæ laurocerasi, ʒjss.
Syrupi mori, ʒj.
M. f. mist. A tablespoonful every hour. (*Bamberger.*)

To lower pulse and temperature in same.

℞ Sodii salicylatis, ʒjss.
Syrupi simplicis, ʒv.
Aquæ ad ʒviij.
M. f. mist. A tablespoonful every hour. (*Bamberger.*)

Chloral enema in same.

℞ Chloral hydrate, gr. xxx. ad xl.
Mucilaginis acaciæ, ʒivss.
Aquæ, ʒjss.
M. f. enema. (*Bamberger.*)

Mixture for catarrhal pneumonia.

℞ Ammonii chloridi, gr. lxxx.
Syrupi scillæ *vel* senegæ, ʒiij.
Liquoris ammonii acetatis ad ʒiv.
M. f. mist. A dessertspoonful in water every three hours. One or two drops of tincture of aconite may be added to each dose, carefully watching the effect.

Another.

℞ Ammonii carbonatis, gr. xlvi.
Mucilaginis acaciæ } āā ʒss.
Syrupi }
Tincturæ lavandulæ compositæ, ʒij.
Aquæ ad ʒiv.
M. f. mist. One teaspoonful in water every two or three hours for a child three years old. (*Pepper.*)

Another, if respiratory failure threatens.

℞ Quininæ sulphatis, gr. xxiv.
Strychninæ, gr. ¼.
Acidi hydrochlorici diluti, ♏xv.
Glycerini, ʒiij.
Liquoris pepsinæ ad ʒiv.
M. f. mist. A teaspoonful in water every three or four hours for a child five years of age. (*Pepper.*)

Powders in catarrhal pneumonia.

℞ Hydrargyri subchloridi, gr. j.
Sodii bicarbonatis, gr. xxiv.
M. et div. in pulv. xij. One or two every three hours, until the bowels are moved once or twice.

Digitalis mixture for pneumonia.

℞ Spiritus ammoniæ aromatici, ʒss.
Extracti digitalis fluidi, ʒijss.
Glycerini, q.s. ad ʒiv.
M. f. mist. A teaspoonful every three or four hours, to be increased as the case may require.
(*Dr. R. J. Bond.*)

CHAPTER VI.

THE TREATMENT OF PLEURISIES.

Classification of Pleurisies according to their Causation, Course and Results.

Simple Dry Pleurisies—Symptoms—Latent Apical Pleurisies—Their Recognition and Significance—Treatment of Dry Pleurisies—*Pleurisies* with *Sero-fibrinous Effusion*—(*a*) *Treatment* of Cases with *Small* Effusions—Leeches—Opium—Counter-irritation—Cold Applications—Aperients—Diuretics—Antipyretics—(*b*) *Treatment* of *Moderately Large* Effusions—Counter-irritation—Mercurial Inunctions—Limitation of Fluids—Change of Air in Chronic Cases—Milk Diet—Diuretics, etc.—(*c*) *Treatment* of *Large* Effusions—Physical Signs—Pilocarpine—*Thoracentesis*—Dangers of Delay—Indications for Operation—Puncture with *Aspiration*—Apparatus—Method of Operating—*Precautions* necessary—Accidents and Dangers.

Pleurisies with *Purulent* Exudation—*Empyemata*—Etiology—Bacterial Influence—Diagnosis—Value of Exploratory Puncture—Modes of Termination—Possibility of Spontaneous Absorption—Operative Measures—Aspiration—Pleurotomy—Simple Incision—Resection of Rib—Drainage—Irrigation—Antiseptic Dressings—Thoracoplasty. Additional Formulæ.

THE therapeutics of inflammations of the pleura are not greatly dependent on etiological considerations; they are more directly concerned with considerations of the severity and course of each particular case. Still, it is necessary to examine briefly the classification of pleurisies, both etiological and clinical.

Pleurisies have been divided into *primary* and *secondary*.

Primary acute pleuritis has generally, hitherto, been referred to *chill*, and has been looked upon as related to rheumatic inflammations. But it has been suggested that "catching cold" does not of itself explain the origin of these cases. Cold, it is urged, only prepares the soil for *microbic* infection, and the microbes themselves may reach the pleura, through lymphatic channels, starting, for example, from the tonsils. But this, at present, is only speculation,

while there can be no doubt of the occurrence of attacks of acute pleuritis after exposure to chill. Many cases of pleurisy are certainly tubercular, but it is an extravagant conclusion to teach that they are all of this nature, as some French authors do.

Secondary pleurisies may be excited by a variety of causes. They may be *traumatic*, and produced by wounds, contusions, and other injuries of the wall of the chest; they may accompany *diseases of the lungs*, *pericardium*, and *mediastinum*, inflammatory or malignant; they may be due to *morbid states of the blood*, *constitutional* or *infective*, as in *septic* or *uræmic* states, and in the *tubercular*, *rheumatic*, and *syphilitic*. Pleurisies may also be classified according to their *course* and *results*. They may be *acute*, *sub-acute*, *chronic*, and *latent*, and the *result* may be an *adhesive* exudation (*dry* pleurisy), causing adhesion of opposed surfaces, or a *sero-fibrinous*, *sero-purulent*, or *hæmorrhagic* fluid exudation (pleurisy with effusion), which may accumulate in the pleural cavity, and vary in amount to almost any extent.

The chief considerations which affect the **treatment** of pleurisies are (1) whether they are *primary* or *secondary;* (2) whether they are attended with *fluid* or *adhesive* exudation (*i.e.* with or without effusion); (3) whether the effusion is *sero-fibrinous* or *sero-purulent;* and (4) whether the effusion is *small*, *moderate*, or *large* in amount.

First, with regard to **simple dry pleurisies.** In these cases there is merely inflammatory thickening of the pleura—due to proliferation of its normal connective tissue—and adhesion of its opposed surfaces as the usual result.

Some forms of dry pleurisy are almost completely *latent*, so that dry pleurisy has been said to have "no symptoms," and adhesions of the entire pleural surface have been found *post-mortem* in the bodies of persons who never have been seriously ill.

Attacks of *dry pleurisy* affecting the *apex* and upper part of the lung—*i.e.* those parts of the chest

which are almost motionless in ordinary tranquil breathing—are much more likely to be "latent"—to pass unobserved—than similar attacks involving the lower and more movable parts of the chest.

Scanty fibrinous exudations in the latter situation are commonly attended with the following symptoms: *sharp pain*, or "stitch" in the side, on inspiration, or on coughing or sneezing; *tenderness* on pressure over certain ribs or intercostal spaces; *shallow*, cautious inspiration, the body being usually inclined towards the side affected; *cough* may be present or absent; a *friction* sound, or "pleuritic rub," can be heard on auscultation of the affected side of the chest.

The **treatment** of ordinary uncomplicated cases of **dry pleurisy**, affecting the *lower* part of the chest and attended by the symptoms mentioned, is simple.

If the *pain*, "the stitch," is very severe, and if the temperature is raised two or three degrees, as is frequently the case, a few leeches applied to the seat of pain, followed by a hot linseed poultice or a hot compress, is usually very efficacious in giving relief.

Some German physicians advocate the local application of cold (cloths wrung out in ice-cold water) in such cases, but this method is repugnant to many patients, and should the pleuritis have a rheumatic origin it might prove injurious. Limiting the movements of the ribs, etc., in breathing, by the firm application of a flannel roller, or a broad band of adhesive plaster, around the base of the chest is valuable.

A few small doses of opium in combination with mild salines has an excellent soothing and anodyne effect in these cases of severe pleuritic pain. The following is a good formula:—

℞ Pulveris ipecacuanhæ compositæ... ... gr. v.
Potassii citratis gr. xx.
Liquoris ammonii acetatis... ʒij.
Aquæ camphoræ ad ʒj.

Misce, fiat haustus. To be taken every three or four hours until the pain is relieved. In rheumatic cases it may be serviceable to add 10 grains of **salicine** or **sodium salicylate** to each dose.

The bowels should in all cases be kept freely relieved by means of 1 or 2 drams of sodium sulphate dissolved in 1 or 2 ounces of warm water the first thing every morning. If the tongue is thickly coated and the urine high-coloured, it will be advisable to give also at night a grain of calomel with 4 grains of colocynth and henbane pill. After the acute pain has disappeared, and if friction sounds are still heard, small flying blisters over the seat of the friction or repeated applications of iodine paint are of use. Some physicians recommend the *immediate* application of a blister, but we do not think this is desirable, as most of these cases of dry pleurisy get quickly well with the simple measures here described. The patient should be, of course, confined to his room, and, if there is fever present, to his bed.

The **treatment** of pleurisies with more or less **sero-fibrinous effusion** must be to some extent determined by the amount of the effusion and the interference with function produced by it.

The amount of effusion in these cases will vary from a few ounces—just enough to give rise to three or four finger-breadths of dulness at the base of the chest—to several pounds, filling up the whole of one side of the chest, compressing and flattening the lung completely, displacing adjacent organs, and causing serious dyspnœa from interference with the respiratory and circulatory functions.

The treatment appropriate to these varying conditions must also vary. We propose to consider:—

1st, the treatment of cases with *small* effusions;

2nd, those with *moderate* effusions; and

3rd, those with *large* effusions.

1. The treatment of cases of acute pleuritis with only a **small** amount of fluid effusion, giving rise to three or four finger-breadths of dulness at the base of one lung, may be conducted on much the same plan as that of acute dry pleurisies.

At the onset of the attack we shall usually find more or less fever, a temperature of 102° to 103°,

and more or less pain in the side; and the indication for treatment is to relieve these symptoms and to *diminish the intensity of the pleural engorgement*, and so prevent the further effusion of fluid or promote the absorption of that already effused. Severe *pain* in the side must be met by the application of six or eight leeches, followed by a hot linseed poultice, and this succeeded by a flannel bandage applied tightly round the chest, so as to limit the respiratory movements. If the pain still continues, flannels or spongio-piline wrung out in hot water, and freely sprinkled with laudanum or opium and belladonna liniment, will be useful. Repeated moderate doses of opium, internally, should also be given to allay the distress of breathing, to calm the patient, and to produce a subjective condition favourable to recovery. There is no doubt, also, that opium exercises a controlling effect over the capillary circulation in the inflamed serous membrane, and so tends to moderate the inflammatory changes. When there is much fever, it may be combined with *salicin* or *sodium salicylate* and a saline diaphoretic, especially in rheumatic cases, as in the following formula :—

℞ Extracti opii liquidi ♏x.
Salicini gr. x.
Potassii citratis gr. xx.
Liquoris ammonii acetatis ʒiij.
Aquæ ad ʒj.

Misce, fiat haustus. To be taken every three hours until the pain is relieved.

It is desirable at the same time to obtain one or two loose actions of the bowels daily, and this may be secured by giving the aperient pill and the sodium sulphate, as already described. The opium should be discontinued as soon as the pain is relieved. If there is much irritative cough, it may be allayed by giving the patient a morphia and ipecacuanha lozenge to suck from time to time. As soon as the fever has subsided —which will usually be in from two to seven days—

counter-irritation should be applied over the seat of the effusion.

The best form of counter-irritation is the "*flying*" *blister; i.e.* instead of one large blister kept on for several hours over the same spot, repeated small blisters not bigger than a crown piece are applied in succession to different, but adjacent, parts of the chest over the area of dulness, and kept on from two to four hours, according to the effect produced, which will vary with different patients. By the use of small blisters, retained for only a short time, we avoid any extensive vesication, as well as any renal or vesical irritation in persons prone to cantharidism, and we are enabled to reapply them, after a short time, over the same spot.

By blistering and by *dry-cupping*, which some employ, we obtain a powerful derivation to the skin, for they both act by dilating the vessels of the skin, and so we diminish the over-distension of the vessels in the pleura.

The local application of iodine is a valuable measure, which acts similarly to a blister, and is more convenient in small effusions tending to become chronic.

Of course, while there is any fever the patient must be confined to bed, and kept on a light diet, the chief constituents of which should be milk, gruel, beef-tea, light clear soups and broths, and eggs beaten up with milk.

The use of **diuretics** to promote the absorption of the fluid effused has been advocated by some, but little reliance is to be placed on them. Potassium iodide has, however, been found of value for this purpose in cases of rheumatic origin.

By measures such as these most cases of ordinary pleurisy with small effusion in healthy persons will soon be cured.

It will be seen that we have said nothing of the use of general *bleeding*, or of *tartar emetic*, or of *mercury*, in the treatment of acute pleuritis, and it is

because we do not consider they have any place in the *rational* treatment of this disease.

Antipyretics, such as antipyrin, antifebrin, salol, and phenacetin, advocated by some physicians in the acute febrile stage, are rarely needed, but if the temperature is unusually high we see no objection to a few 3- or 4-grain doses of *phenacetin* given in combination with 2 or 3 grains of *hydrobromide of quinine* every two or three hours. We should not continue the phenacetin after the temperature has been reduced. The importance of allaying *cough*, which aggravates the *pain* of the acute stage so greatly, has been dwelt upon by most writers; *opium* is, as we have said, the best remedy for this purpose.

The constipating effect of opiates should be anticipated by the administration of an initial dose of 2 or 3 grains of calomel, followed by a saline aperient; by thus getting rid at starting of all accumulations in the alimentary canal, we shall have less hesitation in giving opium freely to relieve pain and cough. Aperients should be repeated when required, but we see no good reason for disturbing the patient by frequent purges.

Tonics of quinine or bark, together with strychnine or iron, will be useful during convalescence.

2. We have next to consider the treatment of cases with **moderately large** effusion, with percussion dulness, extending up to, or a little above, the angle of the scapula.

The same plan and principles of treatment which have just been sketched apply equally to these cases, except that counter-irritation will probably require to be more vigorously carried out and continued longer; and if the effusion lingers long, and shows signs of increasing rather than diminishing, and is uninfluenced by this treatment, and especially if the patient begins to suffer from dyspnœa on slight exertion, or his general health appears to be affected, then, even in the case of moderate effusions, we may wisely have recourse to *paracentesis* for the with-

drawal of the fluid, or a portion of it; for it is not uncommon to find the withdrawal of even a small quantity of fluid from the pleural cavity to be followed by rapid absorption of the remainder.

We should, however, be in no haste, in these cases of moderate effusion, to advise paracentesis. Well-directed and repeated counter-irritation, sometimes in the form of flying blisters, sometimes in the form of iodine paint, and sometimes, as suggested by Niemeyer, the rubbing into the chest of half a dram of mercurial ointment * twice daily, until some slight effect on the gums is produced, will promote the removal of the effusion, and avoid any necessity for an operation, which some sensitive patients dread.

The disappearance of some of these moderate effusions may be promoted by a strict limitation of the amount of fluid consumed: only just sufficient liquid being allowed the patient to prevent his suffering from thirst.

It will not unfrequently happen that after a certain amount of the effusion has disappeared the remainder will linger unabsorbed and uninfluenced by any of our remedies; in such cases it is often of great service to prescribe *change of air*, especially when the season of the year is favourable. Removal to the seaside will in some cases be attended with immediate improvement, or, still better, change to a Swiss *Alpine* resort, where, in addition to the tonic effects of fresh, pure, bracing air, a certain amount of lung gymnastic is induced, will promote the absorption of the lingering exudation and the re-expansion of the lung.

Pleural effusions have been reported as rapidly disappearing under the diuretic influence of *caffeine* combined with sodium benzoate, about 40 grains of each, daily, associated with a milk diet. The administration of drastic, hydragogue cathartics, like *elaterium*, we only mention in order to condemn.

* Fräntzel also advises mercurial inunctions: Ziemssen's "Cyclopædia," vol. iv., p. 686.

3. In the next place, we must consider the treatment of pleurisies with a **large** amount of *sero-fibrinous* effusion.

The co-existence of the following physical signs may be regarded as indicative of the presence of a *large* effusion in the pleural cavity:—(1) Visible and *measurable* distension, with immobility of the affected side of the chest. (2) Absolute dulness on percussion over a great extent of surface, front as well as back. (3) Absence of vocal fremitus over the dull area, as well as a sense of fulness and absence of elasticity conveyed to the hand placed on the chest. (4) Entire absence of respiratory murmur on auscultation over the greater part of the affected side. (5) Considerable displacement of adjacent organs, of the heart to the right or left, of the liver downwards on the right side, and the spleen on the left.

It must, however, be borne in mind that a very considerable effusion may exist without the co-existence of all these physical signs, and we must, therefore, attend to such evidences as may be furnished by other symptoms, such as great dyspnœa on making even slight movements, cyanosis, evidence of cardiac feebleness, and distension of the right side of the heart—as a small irregular pulse, palpitation on any exertion, scanty, high-coloured urine, etc.

We must also bear in mind that the largest effusions are often found in cases in which the symptoms develop slowly and in an almost imperceptible manner.

In the management of *large* effusions during the early febrile stage the same measures may be adopted as we have described as applicable to the treatment of small and moderate effusions, and if we see any signs of diminution in the amount of the fluid effused, we may persevere with these measures, and wait patiently for a further subsidence of the exudation. There is no occasion for alarm or hurry so long as no serious signs of circulatory or respiratory failure make their appearance and no great amount of cardiac displacement is detectable. But if after the febrile stage

has passed away, and at the end of the second or third week of the illness, there still remain the evidences of a large effusion which shows no sign of diminution, it will be rarely advisable to waste time in further medicinal treatment. The hypodermic injection of $\frac{1}{6}$th of a grain of *pilocarpine* has been advised in the treatment of these large effusions, the profuse diaphoresis and salivation thus produced having been found, in some instances, to favour the disappearance of the exudation. But it must be remembered that *pilocarpine* produces serious circulatory depression, and where there is no particular reason to fear the effects of puncture of the pleural cavity we should be disposed to prefer it. While we are by no means disposed to advocate hasty or early resort to *paracentesis thoracis*, especially in cases in which there appears to be a reasonable chance of removal of the effusion by absorption, we are nevertheless averse from unnecessary waste of time in the application of inefficient measures for the removal of a large effusion, attended with serious respiratory trouble, or of long duration, and which shows no signs of disappearing. The inconveniences and dangers accompanying such delay are not imaginary, while the operation of puncture with or without aspiration, performed with the precautions and care we shall immediately insist upon, is one of the simplest and safest possible. No doubt the operation when first introduced, and when performed with insufficient care, caution, and skill, was not unfrequently attended with certain drawbacks and dangers, but these are rarely heard of now.

Delay in the removal of some portion of an extensive effusion may be attended by serious results. Not only does it lead to over-distension and enfeeblement of the right side of the heart and hyperæmia of the opposite lung, not only is there some risk by unreasonable delay that the compressed lung may become bound down by firm bands of lymph, or become the seat of fibroid changes, and so be prevented from re-expansion, but the danger of sudden death from dis-

placement of the heart when the effusion is large and situated on the *left* side must be borne in mind.

As we have already said, we should not be in haste to puncture in *recent* effusion, even if extensive, although early puncture in the febrile stage has had many advocates, and even so careful an observer as Potain has seen no objection to thoracentesis as early as the second or third day; but we do not consider this operation justified during the febrile period, unless the effusion is so large and the interference with respiration and circulation so great as to endanger life; then, of course, there should be no hesitation, and the pleural cavity should be at once punctured, and a certain amount of the effusion withdrawn.

We may conclude, then, that **thoracentesis** is indicated, whether in the *acute* or *chronic* stage, whenever the effusion is so large as to interfere seriously with the functions of respiration and circulation. It is also indicated when the effusion is considerable and shows no tendency to diminution with other methods of treatment; and it is also indicated when the effusion has existed so long that there is danger of the lung remaining permanently compressed and inexpansible unless the pressure upon it be removed. The existence of effusion into both pleural cavities may also point to the need of withdrawing a portion of the fluid from one, an expedient which will often be followed by the absorption of the fluid in the other.

When we advocate *thoracentesis* for the relief of pleuritic effusion, we refer to the combination of *aspiration* with *puncture*, as is now usually practised.

The apparatus necessary for this operation is quite simple. We need (1) a small *trocar* or a hollow, sharp-pointed, quill-shaped needle, for piercing the chest; (2) an exhausted receiver—any ordinary bottle or flask will do; (3) an exhausting syringe or pump; and (4) air-tight tubes connecting these. The use of hollow, sharp-pointed needles is very common in England, but we consider the objection made to them a valid one—viz. that there is a danger, as the lung expands

at each inspiration, of its surface becoming wounded or irritated by contact with the pointed end of the needle. The most suitable and convenient form of apparatus for the purpose of thoracentesis is that known as Potain's. The accompanying drawing (Fig. 17) shows the apparatus in use, and needs little explanation :—

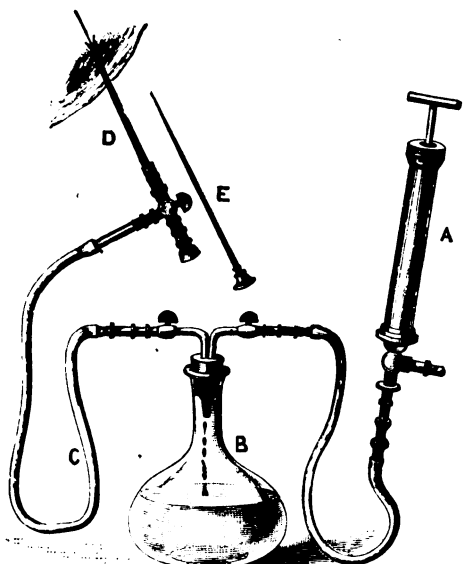


Fig. 17.—Potain's Apparatus for Thoracentesis.

B is an ordinary bottle or flask, in which a vacuum is made by the exhausting syringe A. C is a tube connecting the exhausted receiver with the trocar, which is used for piercing the chest wall, and E is the stylet withdrawn from the cannula D, which can be re-introduced should the latter become obstructed during the exit of the effusion.

The trocar and needles vary in size. We prefer the *smaller* ones, as we greatly object to the *rapid* evacuation of the fluid, which the larger instruments

encourage, and which was, we believe, together with want of sufficient cleanliness, the cause of most of the dangers which have been described as attending this operation. With a *small* trocar the operation is less painful and less dreaded by the patient. All that can be said in favour of the large hollow needles, which we have often seen used, is that they save the time of the operator—an unworthy consideration, which should never be allowed to weigh with us—and are less likely to be obstructed with fragments of lymph floating in the pleural effusion. But in Potain's apparatus the cannula can readily be cleared by the reintroduction of the stylet. We have seen the large needles also become blocked, and in that case a fresh puncture has to be made. A trocar with a diameter of $\frac{1}{12}$th of an inch is large enough.

It is of extreme importance to examine every part of the apparatus before using it—to test the stop-cocks, and to see that the tubes and needles are quite clear. It is also of the very greatest consequence that every portion of the apparatus, and especially the trocar and cannula, should be perfectly *aseptic*. It was undoubtedly owing to a disregard of antiseptic precautions that to puncture and aspiration was formerly frequently attributed the conversion of a serous into a purulent effusion.

The puncturing part of the apparatus, whether needle or trocar, should be washed with a 10 per cent. solution of carbolic, and afterwards dipped in alcohol and passed through the flame of a spirit-lamp, and some warm 5 per cent. carbolic solution should be aspirated through the tubing attached to the trocar.

The part of the chest selected for puncture should be cleansed with soap and water, and finally wiped with cotton-wool soaked in an alcoholic solution of carbolic acid.

As to the best place to make the puncture, opinions differ somewhat, but there is a certain consensus of opinion in favour of the axillary region, and the particular intercostal place selected must depend on the

amount of the effusion; on the right side, the fifth or sixth interspace, and on the left side, the sixth or seventh may, as a rule, be safely chosen. We are accustomed to introduce the trocar about *an inch in front of the posterior axillary line* and into the intercostal space which lies just below the angle of the scapula, when the arm is advanced and drawn across the chest, as it should be for this operation.

This situation has these advantages :—

(*a*) It is easily found.

(*b*) The patient is able to assume a comfortable position, and one convenient to the operator—*i.e.* raised in bed on pillows, with the arms crossed on the chest.

(*c*) The patient does not see the puncture.

(*d*) If we go nearer the spine the intercostal spaces become too narrow, and the wall of the chest is thicker and more difficult to pierce through, and the position is not so convenient to the patient or the operator.

(*e*) You run no risk of wounding any important organ.

You must feel for the depression of the intercostal space with the point of the left index finger. This is somewhat difficult with stout patients. Then, supporting the trocar, which should be previously dipped in carbolic oil and be grasped firmly by the right hand, against the left index, you thrust it quickly and firmly through the intercostal space into the pleural cavity, taking care to avoid the situation of the intercostal vessels and nerves which lie under the lower border of the rib above. The skin, if it should appear to be very thick and tough, may be divided by a slight cut of a knife, but this is rarely necessary when using a small trocar. In sensitive patients it is advisable to anæsthetise the skin before puncturing, and this is best done by the hypodermic injection into the subcutaneous tissue of a few drops of a 5 per cent. solution of cocaine hydrochloride. If the trocar should unfortunately come against a rib, it must be partially or wholly withdrawn and re-introduced.

It is a good plan to tell the patient to take a deep inspiration and hold his breath for an instant when you are about to puncture. The intercostal spaces are thus expanded.

After the introduction of the trocar the stylet is withdrawn and the tap of the trocar closed. At the same time you open the tap connected with the exhausted bottle, and the liquid flows into it from the pleural cavity.

It will sometimes happen that the cannula or needle becomes blocked by a plug of false membrane, which has been sucked into it from the pleural cavity, and which prevents the flow of fluid through the tube. To remove this, the trocar is again passed through the cannula, or, when a needle is used, a blunt-pointed plunger, which is connected with some needles, is passed through the tube of the needle to clear it.

Some think there is danger, in doing this, of introducing air into the pleural cavity, and prefer to make a fresh puncture; but it must be remembered that, trifling as the operation of puncturing the chest may seem to the operator, the patients themselves particularly object to it, and there is always a tendency in the patient's mind to believe there has been some bungling on the part of the operator if the puncture has to be repeated; and if care be taken to have a close-fitting plunger or trocar, well oiled with carbolic oil, and if the apparatus is really well made, there ought not to be any danger, on re-introducing the trocar, of admitting air into the pleural cavity.

It is not necessary, nor is it usually advisable, to withdraw as much fluid as you can from the pleural sac. Indeed, it is rarely desirable to withdraw more than 50 to 60 oz. at one aspiration. For it has been often observed that when aspiration has been carried to a greater extent than this, the patient, on returning to the horizontal position, has been seized with violent and persistent attacks of cough of the most distressing kind. This is all the more likely to occur if the fluid has been withdrawn rapidly. If it is

wished, for any reason, to remove a considerable quantity of fluid at one aspiration, it should be done very slowly and with interruptions, so as to allow of a *gradual* return of the compressed lung to the altered physical conditions.

We have always been in the habit of terminating the aspiration at once if, after the withdrawal of a certain amount of liquid, the patient begins to have a troublesome cough* or to complain of severe pains within the chest. It is certainly most undesirable to remove a large quantity of fluid *very rapidly*, so as to expose the previously compressed and displaced viscera to suddenly altered physical conditions; by using a fine trocar, and by occasionally interrupting the outflow by compressing the tube connected with the pleura, we avoid a too sudden disturbance of the pre-existing physical conditions within the chest. It has also been observed that profuse *expectoration of albuminous fluid* sometimes follows a too rapid removal of a large mass of fluid from the pleural sac, and this has been shown to be due to sudden congestion of the previously compressed lung, the vessels of which may well have lost some of their tone and natural physical properties, after long compression, so that on the sudden re-entrance of blood into them some of its albuminous constituents are allowed to escape through the vascular walls.

In certain rare cases of sudden death after aspiration, this has been thought to be caused by sudden cerebral, and especially *bulbar*, anæmia, due to the afflux of blood to the hitherto compressed lung. It is a good plan to give the patient a little brandy and water before the operation, and to repeat the dose, or, if necessary, give some ether and ammonia during the operation, especially if any feeling of faintness is complained of.

* The use of a manometer to indicate the amount of intra-pleural tension is an unnecessary complication of the operation; and we agree with Schreiber that "the physiological phenomena which promptly indicate the existence of dangerous tension-reduction are even safer indices than the manometer."

Having withdrawn the necessary quantity of fluid, the cannula or needle should be removed gently, compressing the skin around it with the fingers as you do so, so that no air shall enter the chest; and then a pledget of lint, dipped in collodion, should be at once applied over the puncture, which should be covered with another fold of lint fixed with a strip or two of adhesive plaster; a flannel bandage should then be applied tightly round the chest.

We have been accustomed to apply, after aspiration, a broad piece of adhesive plaster very firmly round the affected side, so as to restrain as much as possible the respiratory movements of the chest wall and to keep the lung at rest, and to prevent any unpleasant effects after the operation.

A portion of the effusion having been removed by aspiration, not unfrequently the remainder is absorbed; or the level of the fluid in the pleura may remain stationary; and in order to promote its absorption we may have to employ counter-irritants in the manner already described in speaking of the treatment of moderate and small effusions.

Or the fluid may slowly re-accumulate and necessitate another aspiration. But if the fluid re-accumulates rapidly, it must be borne in mind that its re-accumulation may be due to the fact that the compressed lung is bound down by permanent bands of false membrane, and cannot expand when the fluid is withdrawn. In that case, to continue withdrawing the fluid by aspiration would simply exhaust the patient, as we should be repeatedly draining off the serum of the blood into the pleural cavity.

It is advisable, before resorting to aspiration, to make sure that the diagnosis is correct, as well as to ascertain, with certainty, the nature of the exudation we have to deal with. For this purpose an exploring puncture should be made with a hypodermic syringe, provided with a rather long and stout needle. After carefully cleansing the needle with carbolic solution, it should be introduced into the chest (the surface of

which has also been made aseptic), below the level of dulness, and if then the piston of the syringe be drawn up, the barrel of the syringe will become filled with fluid, and you can see whether it is serous, or purulent, or hæmorrhagic. The working of the syringe must be tested beforehand, or the test may fail simply from the defective condition of the syringe.

If after aspiration the patient is troubled with cough, small doses of morphine—$\frac{1}{24}$th of a grain—in half an ounce of chloroform water, should be given every hour or two until the symptom is relieved. Warm milk and seltzer or Apollinaris water, with a little brandy or whisky, every few hours, will also contribute to relieve this cough, which is probably often due to the presence of a little adhesive tenacious mucus in the long-compressed bronchi.

Much was written formerly about the *dangers* attending the operation of thoracentesis. We have already alluded to one of these, viz. the occurrence of *albuminous expectoration.* This occasionally assumed serious proportions, and was due to intense congestion of the previously compressed lung. This accident was undoubtedly caused by the too rapid withdrawal of too great an amount of fluid; and, as has been urged by Dieulafoy and other experienced physicians, it is of the greatest importance not to withdraw large amounts of fluid at one sitting, especially in old cases where the lung has been long compressed.

Other dangers or accidents cited by authors are: wounding the intercostal vessels, injury to the rib, puncture of adjacent viscera, liver, spleen, and heart, failure to withdraw fluid owing to plugging of needle, admission of air and conversion of a serous effusion into a purulent one, production of serious paroxysms of cough and severe intrathoracic pain; all these dangers and accidents may be avoided, as we have shown, by caution and care in the performance of the

operation and proper attention to the fitness of the instruments employed.

The *treatment of* **purulent effusions** must next occupy our attention.

This form of pleuritis is far more common in childhood than in adult life. It often occurs then as a complication of broncho-pneumonic attacks, or in association with measles or scarlet-fever, or other infective maladies. It also occurs sometimes in the puerperal state, and is not rarely dependent on pulmonary tuberculosis. It may have a more or less obvious local origin, as from abscess in the chest wall, due to disease of bone opening into the pleural cavity; or the same may happen with an hepatic abscess or a hydatid cyst; or it may be associated with intrathoracic cancer. It would seem at times as though merely a low, depressed state of the general health determined the purulent transformation of a pleuritic exudation, so that it may result in this way from a primarily sero-fibrinous effusion.

It has been maintained that *primary* purulent pleuritis is *extremely rare*, and that, in almost every case, the effusion is at first sero-fibrinous, and becomes, for some reason or other, subsequently purulent.

Modern bacteriological research traces the origin of *purulent* pleural exudation to the influence of *pyogenic* micro-organisms. The sero-fibrinous exudations, it is said, are the result of the action of non-pyogenic micro-organisms, whereas the *sero-purulent* exudations are determined by the presence of *pyogenic* bacteria; or both kinds may be present, giving rise to a *mixed* infection.

Purulent pleuritis may, we are also taught, vary in its characters and tendencies, and, therefore, in the therapeutic measures most suitable for its relief, according to the particular variety of pyogenic microbe associated with its origin.

The most amenable to treatment are those—and they are the great majority—caused by the pneumococci (Diplococcus pneumonicus); they are usually connected

with attacks of pneumonia, and are most frequent in the pleuritic effusions of childhood. This micro-organism is comparatively benign in its tendencies, and simple *aspiration* is often sufficient to effect a cure of the empyemata caused by it. The physical characters of this exudation are the following: it is *fibrino*-purulent, having a large quantity of fibrin in suspension in the form of flakes or false membranes; it has a slightly greenish tinge, is odourless, and is more fluid than ordinary pus.

The Streptococcus pyogenes appears to be the most common cause of empyemata in adults. These micro-organisms have a progressively destructive tendency; they are never spontaneously absorbed, but must be treated by free incision and drainage, with strict antiseptic precautions. This form of pus is found in the empyemata associated with infective diseases, scarlet fever, measles, pyæmia, etc., or which follow the puncture of sero-fibrinous effusions with instruments that are not aseptic. It is usually of a greenish creamy aspect, thicker than the preceding, and may be darkened almost to a chocolate colour by an admixture of red blood corpuscles. Then there are the *putrid* and *gangrenous* varieties, due to the presence of *saprophytic* organisms, and easily recognised by their odour and aspect; these forms require not only aseptic *pleurotomy*, but also *antiseptic irrigations.*

Finally, there is the *tubercular* variety, characterised by the presence of Koch's bacillus. This form of pus is not easily identified, especially as it may also contain pyogenic micro-organisms, and a search for the *tubercle bacillus* is more often unsuccessful than successful.

Are there any signs or symptoms by which we can determine that a pleuritic exudation is purulent?

The physical signs are the same as when the effusion is sero-fibrinous, but it is commonly stated as a mark of distinction that in cases of empyema there is *œdema* of the wall of the chest; this

however, is certainly as often absent as present in such cases. Greater intensity and longer duration of *pain* are also said to distinguish purulent and tubercular from serous effusions.

Better and more reliable evidence is the continuance of fever, which assumes a hectic type. When the subject of an effusion into one or other pleural cavity continues to present the symptoms of a certain type of fever—a temperature, with considerable diurnal fluctuations, rising in the evening and falling towards the morning, together with occasional shiverings and sweatings, a hectic flush on the cheeks, or an unhealthy, muddy complexion, with loss of appetite, emaciation, etc.—in such a case we may justly suspect that the effusion is purulent. If any doubt remains in our minds as to the nature of the effusion, it can be readily removed by a simple exploratory puncture by means of a hypodermic syringe.

This simple and almost painless means of establishing our diagnosis should always be employed.

It is as well to make the exploratory puncture, unless there should be any reason to the contrary, in the same spot that will be afterwards selected for the radical operation, should this be ultimately required.

Before we consider the best means of dealing with such an effusion, it may be as well to inquire what happens when such an effusion is left to itself.

In the first place, it may cause necrosis of a small portion or spot of the pulmonary pleura, and so lead to a communication between the pus in the pleura and the air-passages, through which the pus may from time to time be discharged in large or small quantities.

In such a case a fit of coughing will sometimes be accompanied by a profuse discharge of pus from the pleural cavity through the air-passages. If this pus has an offensive putrid odour, it shows that air has probably passed into the pleural cavity from the lung through the necrosed spot in the pulmonary

pleura, and that a pyopneumothorax has become established. If the pus expectorated is sweet, it shows either that the opening into the lung is of such a nature that, although it admits of the passage of fluid from the pleura to the air-passages, it does not admit of the passage of air from the air-cells into the pleura, or that, as Lord Lister maintains, the *cilia* of the air-passages are able to prevent the entrance of putrefactive organisms into the deep portions of the lung.

It is possible for an empyema to become cured by such a mode of termination, but such an occurrence is extremely rare.

In the second place, the *pus* may, after necrosis of a portion of the *pleura costalis*, penetrate between the muscles of the thorax, and point externally, appearing under the skin as a tumour of variable size, usually near the sternum, about the fourth interspace, where the wall of the chest is thinnest. If this burst, the external opening is found usually to communicate by a fistulous tract, which may be three or four inches long, with the opening in the pleura. Through this opening pus will continue to discharge for years, and often gives rise to caries of the ribs. In either of these modes of discharge of an empyema a fatal termination may almost certainly be ultimately looked for, probably after many years of illness and suffering.

These are the cases in which we encounter such remarkable deformity of the chest and spine, owing to slow and continued retraction of the walls of the pleural cavity.

There is, however, a third mode of termination certainly possible in very young subjects, and that is disappearance of the effusion by *absorption*. This has been occasionally observed in childhood, but it is a *rare* occurrence; indeed, it never occurs when streptococci, staphylococci, or tubercle bacilli are present in the morbid exudation, owing to the resistant vitality of the pyogenic bacteria.

What **treatment** should be adopted in dealing

with these cases of purulent effusion into the pleural cavity?

In the case of young children, when the effusion is moderate in amount, and the general health is fairly well maintained, we must bear in mind the possibility of spontaneous cure by absorption, and not be in a hurry to adopt operative measures; especially if on examination of a portion of the pus withdrawn by exploratory puncture with a hypodermic syringe, we find that it is caused solely by the presence of pneumococci, and that there is an absence of pyogenic organisms.

If the empyema has communicated with the air-passages, and pus is being expectorated, and that pus is sweet, not offensive, it is well to wait for a time and see if there is any tendency to spontaneous cure, but if the general health is failing, or the expectoration is fœtid, it is best to operate.

What kind of operative procedure should be adopted?

In most recent cases, and especially in the cases of children, it is advisable to remove the pus once or oftener by aspiration. In several instances in the case of children aspiration has been followed by cure; sometimes even after a single aspiration, but more commonly after three or four.

Aspirate then first in all cases of young subjects, and if the effusion re-accumulates slowly, and is of thin and sero-purulent aspect, repeat the aspiration; but if it re-accumulates rapidly, and is *thick*, it is best not to aspirate more than twice or thrice, but then to have recourse to free incision and drainage. There is a distinct advantage in aspirating, at least once, before having recourse to incision, for the pleural surfaces, which by this measure are brought into contact, may become adherent to some extent, and the adhesions thus formed between the pulmonary and costal pleura contribute to a favourable result after incision, as they leave a less extensive suppurating surface of pleural membrane.

In by far the great majority of cases of empyema it will be necessary to make a free opening, with strict antiseptic precautions, into the pleural cavity (pleurotomy), through which the pus may be discharged and free drainage of the pleural cavity maintained.

The next question that arises is, Where is it best to make that opening? And then another question: Is it best simply to make an incision through an intercostal space or to remove a portion of a rib?

The axillary region is a convenient one for this operation, as it involves no disturbance of the patient's position when sitting up in bed; it is also convenient for the introduction and removal of the drainage-tubes, and it is not pressed upon when the patient lies down, as an opening farther back would be.

If a portion of rib is excised, the sixth, seventh, eighth, or ninth, according to circumstances, may be selected in the mid-axillary line.

It is advisable to avoid making an opening too low down, as the diaphragm soon rises and comes into contact with the wall of the chest, and so might interfere with efficient drainage.

If, as occasionally happens, an accumulation should collect at the base, a subsequent incision may be made behind, in the tenth or eleventh interspace.

If a spontaneous opening has already been made by the pus working its way to the surface of the chest, it is advisable to make use of it, but if in the front of the chest time would probably be saved by making a counter-opening behind and passing a tube through.

The advantages gained by excising a portion of a rib are these: in the first place, you obviate an inconvenience that sometimes arises from simple incision when the intercostal spaces are narrow, for as the chest wall falls in they become still narrower, and you may find, after a time, that it is impossible to introduce a drainage-tube. Secondly, by excising a portion of a rib you are enabled to explore the pleural

cavity with the finger, and sometimes dislodge large masses of curdy material, and secure efficient drainage throughout the progress of the case.

Simple incision is usually sufficient in children, and in some recent cases for adults, but in chronic cases, in which the lung is bound down by adhesions, and is not likely to expand readily, or where contraction of the chest has brought the ribs close together and narrowed the interspaces, or where preliminary aspiration shows the pus to be putrid, resection of a portion of one or more ribs should be determined on.

But when the intercostal spaces are wide, and when the incision is made in the front of the chest, a simple incision in an intercostal space is usually adequate for the purpose.

In making a simple incision, perhaps the best situation to select is the eighth or ninth intercostal space on the left side, and the seventh or eighth on the right, just in front of the posterior axillary line; the skin in this region must be thoroughly cleansed and disinfected. The skin is best prepared by thoroughly washing with warm water and German green soap, then ether or alcohol is used to remove the fatty matter, and finally, a hot sterilised towel, steeped in 1 in 1,000 sublimate solution, is laid over the seat of operation.

The hands and nails of the operator should be scrupulously cleaned and brushed in the manner recommended for the patient's surface. The instruments should be dipped in a porcelain pan containing 5 per cent. carbolic solution. Treves advises chloroform as an anæsthetic, and in children it is practically impossible to operate without a general anæsthetic; but in certain cases in adults, where there is much exhaustion, and when simple incision only is intended, local anæsthetics may be safer. Dujardin-Beaumetz recommended the injection at each end of the line of the proposed incision of a few drops of a 50 per cent. solution of hydrochloride of cocaine, so that the whole of the subcutaneous cellular tissue which is to be incised should be bathed for four or

five minutes in the solution. "An incision from 1½ to 3 inches in length is made transversely, so as to correspond to the upper border of the lower rib bounding the space. The intercostal muscles are divided close to the rib; a director is then gently thrust through into the pleural cavity; the opening made is subsequently enlarged with dressing forceps and the finger. The pus, if considerable, should be allowed to escape slowly. The abscess cavity may be examined with the forefinger as the fluid is escaping, or after it has been entirely evacuated. All thick curdy material within reach of the finger should be removed."* A *short* length of common drainage-



Fig. 18.—Cabot's Folded Drainage-tube for Empyema in Children.

tube, which should be large and not too stiff, should be introduced and kept in during the earlier days of after treatment. "Later, when the cavity is contracting, a bent rubber tube, like a soft tracheotomy cannula, answers the purpose." The drainage-tube must be *carefully secured* from slipping into the pleural cavity. For this purpose it may be provided with a shield like a tracheotomy-tube, or a tube folded upon itself and transfixed with a long safety-pin, as figured here (Fig. 18), has been found useful in children's cases;† the pin can be firmly fixed to the wall of the chest by a strip of adhesive plaster.

After fixing the drainage-tube securely, the skin is cleansed, the wound is dusted with iodoform, and

* Treves, "Operative Surgery," vol. ii., p. 741.
† Keating's "Cyclopædia of Diseases of Children," 1889.

several layers of antiseptic gauze are applied. An oil silk or waterproof protection is placed over this, and the whole secured by a bandage. Frequent change of dressing (twice daily) will, at first, be needed.

In some cases a counter-opening may have to be made lower down.

The drainage-tube must, in adults, be retained in the pleural cavity until the discharge has almost ceased. If after its removal there should be any signs of re-accumulation, it must be at once re-introduced.

When a portion of a rib is excised for the reasons we have already stated, it is first bared of periosteum in order to avoid the intercostal artery, and while steadied with forceps it is divided in two places about 1 inch or $1\frac{1}{2}$ inch apart with a fine saw. "The section may be completed with cutting forceps, but any attempt—especially in adults—to divide the entire rib by forceps is to be deprecated. By such division the bone is unduly crushed and splintered."*

The sac of periosteum is then cut away and the intercostal artery secured. The operation is terminated as in the case of simple incision.

Senn makes some sound practical observations on this matter. He says:—

"A great deal of information is gained, as soon as the incision into the chest has been made, in reference to the expansibility of the lung. If this has not been much impaired the pus will escape with much force, especially during inspiration. Rapid evacuation is attended with some danger from over-distension of the heart and vessels in the lung, and must be guarded against by interrupting the flow from time to time by inserting the index finger into the opening. If the lung expands promptly, its lower margin can often be seen through the opening towards the end of the evacuation. The more the lung expands the less the

* Treves, "Operative Surgery," vol. ii., p. 743.

amount of air rushing through the opening into the chest. In order to prevent syncope upon the sudden diminution of intrathoracic pressure during the evacuation of the pus, I have been in the habit of administering, before the anæsthetic is given, $\frac{1}{100}$th of a grain of atropine with $\frac{1}{8}$th of a grain of morphia hypodermically, with an alcoholic stimulant by the mouth or rectum. If, as is often the case, the pleura is lined with thick, partially detached membranes, these should be removed with a dull curette, as they are invariably infected with pus microbes, and their presence in the pleural cavity would prolong infection and retard recovery."

It used to be a common practice to *wash out the pleura* after pleurotomy, but far greater circumspection is now observed with regard to this practice, which has been shown to be not without danger. It is superfluous in the absence of fœtor and of saprogenic organisms, and it is useless when there exists a bronchial fistula. It should be reserved for the putrid forms of empyema, and those in which extensive false membranes are found adherent to the pleural surfaces. The following fluids have been suggested as quite harmless for this purpose:—Boiled water filtered with a teaspoonful of common salt to each pint; Thiersch's solution of two parts of salicylic acid and 12 of boric to 1,000 of sterilised water; Labarraque's solution of chlorinated soda, 1 in 15 or 20 of water; a 10 to 50 per cent. solution of peroxide of hydrogen; a solution of acetate of alumina, 1 to 5 per cent. Care must be taken that the solution is of the same temperature as the body, and the irrigation should always be made with a small, steady syphon stream, and with a free outlet.

Irrigation by submersion has been adopted in America by S. A. Adams in empyema in children. The child is placed in a bath of boiled water at a temperature of 100° F. for fifteen minutes—the temperature being kept constant during this period by additions of warm water. "With every inspiration the water would run into the two openings and

with expiration it would return laden with pus, which would sink to the bottom. The entire body was kept under water until expiration expelled clear fluid. . . . Sixteen baths were given, extending over three weeks." This mode of irrigation is said to be very thorough and very comfortable to the patient. It is, of course, only applicable to cases in which there is an opening or openings of sufficient size to allow of free ingress and egress of the water.

As we have already said, great attention must be paid to securing the most perfect antisepsis in dressing the wound, and this must be maintained throughout the whole period of healing. The average duration of treatment after operation has been estimated at four months in adults and two months in children.

Much quicker recoveries are, however, common. One of the most rapid we remember was a chronic case in a man of middle age, in which there existed a bronchial fistula, with a periodical discharge of large quantities of pus by the mouth. Pleurotomy was performed by Lord Lister, with resection of a portion of a rib, and the patient was quite well within three weeks!

Another case which we saw with Dr. Sealy, of Weybridge, was operated upon by Professor Watson Cheyne, and the recovery was rapid. In this case also there was a communication with the lung and profuse purulent expectoration. The great value of an exploratory puncture was strikingly exemplified in this case. We had punctured with a hypodermic syringe over a somewhat circumscribed area of dulness in the back, and found pus, but on the excision of a portion of a rib just in front of the site of the puncture no pus was to be found, nor could any collection of pus be reached; but as we were certain of the existence of pus where we had punctured, another operation was made, and a fresh portion of rib was excised immediately over the mark of the exploratory puncture, and pus was of course found. This was a small localised empyema communicating

with the lung, and as there was no tension on its walls from accumulation of pus, the abscess cavity could not be found except by incision directly over it. Before the operation the patient appeared to be sinking from suppurative fever, but as soon as an outlet through the chest wall was made for the pus and the cavity drained, she recovered rapidly.

In some chronic cases we find, after the pus has been evacuated and the pleural cavity drained, that the lung does not expand. It is bound down permanently by adhesions, and there is no chance of the pleural surfaces coming together, so that a fistulous opening remains in the chest, communicating with the pleural cavity, and constantly discharging pus.

To remedy this state of things operations have been proposed and carried out by Estländer, Schede, and others, which have for their object the obliterating of this cavity by the resection of a number of ribs on the affected side. Each operation has to be specially devised for and adapted to each individual case, and its extent must depend on the situation and extent of the cavity which has to be closed. The operation is necessarily a severe one, and is usually attended with considerable shock. For methods and details we must refer to works on operative surgery.*

ADDITIONAL FORMULÆ.

Diuretic to promote absorption of pleuritic effusion.

℞ Caffeinæ, gr. xl.
Sodii benzoatis, gr. xl.
M. et divide in pulv. viij. One in a little water every three hours with milk diet. (*Comby.*)

For pleurisy in the adult.

℞ Morphinæ hydrochloridi, gr. jss.
Quininæ sulphatis, gr. xxij.
Sacchari albi, gr. lxxx.
M. et divide in pulv. xij. A powder every three or four hours. (*Bamberger.*)

* An account of these thoraco-plastic operations will be found in Treves's "Operative Surgery," p. 744.

Mixture for the same.

℞ Pulveris ipecacuanhæ, gr. xij.
Pulveris digitalis, gr. xij.
Aquæ ferventis, ℥vj.
(Infuse for a quarter of an hour and add)
Potassii acetatis, ʒiv.
Oxymellis scillæ, ʒv.
M. f. mist. A tablespoonful every two hours. (*Bamberger.*)

Diuretic mixture for pleurisy in the adult.

℞ Potassii acetatis, ℥ss.
Tincturæ cinchonæ compositæ, ℥ss.
Decocti cinchonæ ad ℥viij.
M. f. mist. Two tablespoonfuls every six hours.
(*Fräntzel.*)

For pleurisy in debilitated persons with anæmia.

℞ Ferri carbonatis saccharatæ, gr. xij.
Quininæ sulphatis, gr. xij.
Sodii bicarbonatis, gr. lxxx.
Sacchari albi, gr. lxxx.
M. et. divide in pulv. xij. A powder three or four times a day. (*Bamberger.*)

For pleurisy with effusion in children.

℞ Potassii acetatis, gr. xx. ad lx.
Syrupi simplicis, ʒiij.
Infusi digitalis ad ℥jss.
Aquæ, ℥jss.
M. f. mist. A teaspoonful every two hours.

Or,

℞ Potassii acetatis, gr. xx. ad lx.
Syrupi aurantii, ʒiij.
Decocti cinchonæ ad ℥iij.
M. f. mist. A teaspoonful every two hours.
(*Widerhofer.*)

Antipyretic and analgesic mixture.

℞ Antipyrin, gr. xx.
Phenacetin, gr. xx.
Syrupi, ʒij.
Mucilaginis acaciæ, ʒij.
Spiritus vini gallici, ℥ss.
M. f. mist. One teaspoonful every hour until fever and pain are relieved; then every two, three, or four hours. (*Matas.*)

Powders for the same purpose.*

℞ Quininæ sulphatis, gr. xx.
Antipyrin, gr. xx.
Phenacetin, gr. xx.
Morphinæ sulphatis, gr. j.
M.; divide into eight parts (in cachets). One to be taken at half-hour intervals, until pain and fever are controlled.
(*Matas.*)

Corson's paint for counter-irritation in chronic pleural exudation.

℞ Olei tiglii, ʒij.
Ætheris, ʒiv.
Tincturæ iodi compositæ ad ℥ij.
M. f. pigm. To be painted over the affected part every morning.

* These powders should only be used when the pain is very severe and when there is no cardiac feebleness.

Part IV.

PHTHISIS, OR CONSUMPTION (PULMONARY TUBERCULOSIS).

CHAPTER I.

INDICATIONS AND PROPHYLAXIS.

Definition—*Indications* for *Treatment*—*Prophylactic* Measures—Avoidance of Unsuitable Marriages—Measures to be enforced on those with *Hereditary* Predisposition—Management of Infancy and Childhood—Of Puberty and the Period of Rapid Development—Value of Sea-air and Sea-baths for the Scrofulous—Tendency to Emaciation to be checked—*Catarrhal* Attacks to be guarded against—Utility of Pulmonary Gymnastics—Avoidance of Unhealthy Occupations—Measures for preventing Dissemination of the Infective Germs—Risks of *Auto-infection*—Disinfection of Sputum, Linen, Apartments, etc. etc.

PULMONARY tuberculosis, or "consumption," is an infective disease, originating in the introduction into the lungs of a specific infective organism, the development and spread of which depend on its encountering a suitable soil, or an inherited predisposition for its culture and growth, or defective resisting power owing to a depressed state of the organism.

The impairment of nutrition which we encounter in this disease, when it has not pre-existed as a determining cause, is a consequence mainly of the infective fever which attends the development of the bacillus tuberculosis and other infective organisms, and the toxins they secrete.

The essential **indications** for **treatment** in pulmonary consumption are the following:—

1. To prevent or amend those faults of constitution, organisation, and development which predispose to the acquirement of the disease.

2. To prevent or cure those local pulmonary affections which may induce a tendency to this

disease, even where no constitutional predisposition exists.

3. To prevent the spread of the disease by the conveyance of its germs from those who are infected to others.

4. To endeavour, if possible, to antagonise the morbid influences of the infective organisms on the lung tissues and on the constitution. To attempt to hinder its extension to the sound parts of the affected lung, and also to the sound unaffected lung, and to prevent the infection of other organs.

5. To lessen and remove the *fever* and other constitutional disturbances dependent on the infection of the system, as well as on local inflammation.

6. To lessen and arrest the catarrhal and inflammatory changes excited by the infective organisms in the lungs.

7. To improve the defective nutrition by all the resources at our command—regiminal, medicinal, and climatic.

8. To relieve the various distressing symptoms and remedy the several serious complications which occur in the course of the malady.

And, first, with regard to **prophylactic treatment.** The prevention of pulmonary consumption may be regarded from three principal points of view: (*a*) the prevention of the transmission of the phthisical disposition or tendency from parent to offspring; (*b*) the prevention of the development of the disease when the predisposition exists; and (*c*) the prevention of those unhealthy conditions, habits, and circumstances of life which are known to favour the acquirement and propagation of phthisis.

(*a*) The hereditariness of the tendency to phthisis has been placed beyond doubt, but from the point of view of prophylaxis it is important to remember that by the hereditary nature of phthisis we do not mean that phthisical parents convey to their offspring a constitution which must *necessarily*, at a given period of life, develop tuberculous disease, but rather that

they transmit to their children an organisation which renders them more prone than others to be attacked by the *tubercle bacillus.*

Marriages between persons who are known to inherit this tendency should be discouraged, and, of those actually infected, forbidden.

(*b*) Next, as to the best means of preventing the development of phthisis in those persons in whom a tendency to that malady is known to exist.

An infant born with such a tendency will require the most careful management. On no account should a mother with phthisical tendencies be allowed to suckle her offspring. There is danger in this both to mother and child. For such infants a vigorous and healthy wet-nurse should be selected, and if possible they should be brought up in the free open air of the country, rather than in the confined atmosphere of crowded cities.

The chest and limbs should not be cramped by any tightly-fitting garments, but allowed perfect freedom of movement. The nurse should be particularly cautioned against permitting awkward attitudes which tend to compress the chest and to hinder its free expansion.

Attempts should early be made to ward off that morbid sensitiveness and vulnerability of the cutaneous surface so common in those predisposed to phthisis, which is, in a measure, the index of bronchial sensitiveness and irritability. We should even in the early months of infant life adopt mildly bracing measures, which may afterwards give place to a more vigorous hardening system. For this purpose, it is a good plan, after the child's morning bath, to sponge over the surface of the body rapidly with cold sea-water, or water containing sea-salt, to which a tablespoonful or two of spirits of wine or eau-de-cologne have been added. This process has a bracing and invigorating effect, especially stimulating to the functions of respiration.

When it is impracticable to obtain a wet-nurse, the

child should be given perfectly fresh cow's milk, boiled, slightly diluted with water, and with a little sugar of milk added. At the period of teething a little beef-juice may be added to the milk, and if dentition be tardy or difficult, some preparation of lime is useful.*

More than ordinary care is needed in watching these children through the common ailments of childhood, especially measles, whooping-cough, and scarlet fever. Measles and whooping-cough are especially dangerous to such children, for the catarrhal and congestive attacks of the respiratory organs, which so constantly accompany these affections, are prone to linger and predispose to pulmonary tuberculosis.

When the child reaches five or six years of age, judicious and careful attempts to further brace and harden the constitution should be systematically pursued. For this purpose free exercise in the open air, wisely devised gymnastic exercises, and cold sponging, cold affusion, or very brief cold douches, should be daily employed.

The removal of hypertrophied tonsils and "adenoids" is advisable, as they impede respiration and diminish chest expansion.

It is necessary to watch carefully the education and school-life of such children. Close application to study in crowded school-rooms must be positively forbidden; overtaxing the physical and mental powers must be carefully avoided, and all faulty attitudes and positions during school studies should be corrected.

There are two periods of life which have been regarded as specially dangerous for those who inherit a predisposition to phthisis. One is the period of puberty, and the other is the period between the ages of 30 and 35.

At the period of puberty we have to guard against the depressed nutrition so often associated with the

* Full details as to the preparation of suitable food for infants and young children will be found in the author's work on "Food in Health and Disease" (new edition), part i., chap. ix.

exhausting influence of rapid growth. A life of wholesome activity in the open air, out-of-door exercises and occupations, a nutritious but unstimulating diet, as well as the provision of healthy food for the mind and the avoidance of romantic and erotic literature—these are wise and necessary precautionary measures at this period of life.

When the strength and nutritive power seem seriously impaired by rapid growth, it will be advantageous for such cases to seek a sunny climate in winter and tonic mountain or sea-air in summer; in both cases in situations where an out-of-door life is possible.

The extreme value of sea-air and sea-baths in combating the tendency to scrofulous affections has been established by long experience, and for delicate children and young people presenting the signs of the scrofulous diathesis, prolonged residence at the seaside and the regular use of sea baths, cold in the summer, and, if necessary, warmed in the winter, are of the greatest benefit.

Sir Herman Weber* and others have warmly advocated the establishment of seaside sanatoria for the reception of poor children suffering from these scrofulous complaints.

The occurrence of loss of flesh is often one of the first evidences of impending danger. But it would be incorrect to conclude, on that account, that all the subjects of progressive emaciation are on their way to become tuberculous.

The emaciation which is so frequently regarded as the precursor of pulmonary phthisis is probably, in most instances, but the first symptom of the actual presence of the disease; a vigilant prophylaxis then requires us to be on our guard, lest we allow a tendency to progressive emaciation in the young and delicate to proceed unnoticed. In such cases we should exercise a careful supervision of the diet, and see that it is sufficient in all respects, and that it includes an adequate proportion of fat and flesh-

* *Brit. Med. Journ.*, August 3rd, 1901, p. 317.

forming food in easily digestible forms. Much firmness often needs to be exercised with delicate and fanciful children to ensure their consumption of a sufficient quantity of suitable food.

Abundant gentle—not exhausting—exercise in the open air is beneficial to such persons, as horse, or carriage, or boat exercise.

(*c*) All such persons as we have been referring to should be protected in every way from the causes of catarrhal, congestive, or inflammatory attacks of all kinds; from indiscreet exposure to changeable or inclement weather; and from the dangers of over-excitement and excesses of all kinds.

Suitable gymnastic exercises for the purpose of increasing the capacity of the thorax, generally small, flat, and narrow in such persons, of strengthening the respiratory muscles and those of the upper limbs, and so of promoting lung ventilation, are of undoubted value.

A few weeks during summer, or a longer period if any troublesome catarrhal attacks have occurred, spent in some mountain district, from 4,500 to 6,000 feet above the sea-level, is valuable, not only for its general bracing effect, but for the pulmonary gymnastics which a residence in the rarefied air of these regions necessitates, and the more complete pulmonary ventilation thereby secured.

All occupations should be avoided which entail confinement in close, ill-ventilated apartments or workshops, as well as those which necessitate cramped attitudes and positions that interfere with proper expansion of the chest and free aëration of the lungs; so also should all employments which involve exposure to irritating vapours or dusts, or other injurious influences, such as sudden and great changes of temperature, which may excite or maintain catarrhal conditions of the air-passages. The choice of out-of-door occupations and the avoidance of sedentary ones should be urged on all those who inherit a tendency to phthisis.

The close relationship between wetness of soil and the prevalence of phthisis should be constantly borne in mind, and those with a disposition to this disease should avoid such localities.

The important point of the prevention of the transmission or **communication** of the tubercle germ from the sick to the sound must next be considered.

Phthisis is spread by communication, *chiefly through the agency of the sputum*, which, when dried, is converted into dust, and carried into the atmosphere, or "by coughing, and even spitting, it is flung into the air in little drops, that is, in a moist condition, and can at once infect persons who happen to be near the cougher." *

Disinfection or destruction of the **sputum** of phthisical patients is of *prime* importance in preventing the spread of tuberculosis. In most cases of phthisis the sputum contains *tubercle bacilli*, often in great numbers. The best means of disinfecting sputum containing these bacilli is to mix it with a five per cent. solution of carbolic acid. But even this requires a contact of twenty-four hours. Exposure to boiling water for ten minutes, or to steam at a temperature of 212° F. for half-an-hour to an hour, is also effective.

The danger of *auto-infection* cannot thus be obviated. "A patient on the road to recovery may be re-infected by his own sputum." If during expectoration some of the sputum should be accidentally aspirated into the sound lung or the sound parts of the affected lung, fresh centres of infection may be started. Some may also be swallowed and infect the intestinal canal. A remedy for such dangers is the regular use of antiseptics, internally and by inhalation—antiseptic vapours, sprays, and mouth washes—the two latter expressly for the purpose of ensuring the expectoration of the contents of cavities in contact

* Brouardel, "Address at British Congress on Tuberculosis," *Brit. Med. Journ.*, July 27th, 1901.

with an antiseptic medium. Those who have foolishly spoken slightingly of antiseptic inhalations have evidently not realised the useful prophylactic nature of the services they can perform, especially in somewhat advanced cases.

Linen, handkerchiefs, underclothing, sheets, pillow-cases, etc., which have incurred the risk of contamination with phthisical sputum may be disinfected by boiling water; blankets, mattresses, etc., by exposure to steam for an hour, or to a dry heat (as in a disinfecting stove) of 250° F. for several hours.

The risk of infection by the dust of dried sputum may be provided against, to some extent, by the following precautions: Phthisical patients must be warned not to spit on the floor, rugs, or carpets, nor in the streets nor into handkerchiefs, unless Japanese paper ones, which can be burnt immediately; but as some sensitive patients will scarcely be prevented from using handkerchiefs for this purpose, these should be plunged into boiling water as soon as they have been used. Convenient spittoons should be provided for every patient, containing a little 5 per cent. carbolic solution to disinfect and keep the sputum moist. These can be made of pasteboard, enclosed in a tin case, so that they can be burnt after use, and the tin case scalded with boiling water. Fig. 19 shows the pattern of one commonly used in America, and termed "Sanitary Cuspidor."

Dettweiler has devised a convenient flask for carrying in the patient's pocket, so as to avoid the necessity of spitting into a handkerchief or in the street; it is shown in Fig. 20.

It is flat, made of blue glass, and holds about three ounces. It will be seen that it has an opening at the top and bottom, fitted with screw caps. To the upper opening is fitted a tightly-shutting spring cover or lid, and a polished metal funnel, which reaches half-way down into the flask. This funnel acts like that of certain ink-bottles, and prevents the

spilling of the contents of the flask even if the cap is left open. The lower opening allows it to be thoroughly cleansed. It is partly filled with dis-

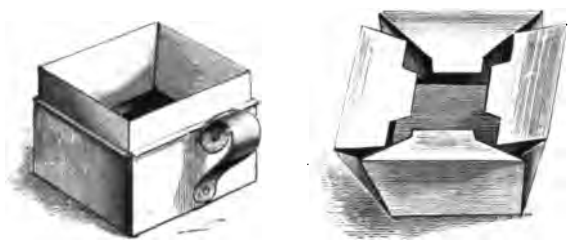


Fig. 19.—Sanitary Cuspidor.

infecting fluid, its contents are frequently burnt, or discharged into the drains, and the vessel is cleansed with boiling water.

Spittoons should be kept *covered*, lest *flies* settling upon sputum should be the means of carrying infec-



Fig. 20.—Dettweiler's Pocket Flask.

tion. In clubs and public places spittoons should be filled with sawdust saturated with a solution of carbolic acid, and their contents frequently burnt.

It is best to provide the phthisical patient with separate knives, forks, spoons, and other table utensils, and to see that they are thoroughly cleansed after using.

As the hair, especially that of the beard, and the nails of phthisical patients may become soiled by sputum, the hair and beard should be worn short, and the nails and beard frequently washed with disinfecting soap. Dust should be prevented from collecting or depositing itself in the rooms occupied by phthisical patients. The walls should be rubbed down with new bread, which is then burnt, and the furniture frequently wiped with a cloth damped by some antiseptic solution. The floor should be sprinkled before sweeping, and the sweepings burnt. Carpets and curtains are best dispensed with altogether. The rooms should be kept thoroughly ventilated by widely opened windows.

Close intimacy with the subjects of advanced phthisis should be avoided, and the bed-room of a phthisical patient should not be shared by anyone. Kissing on the lips should be forbidden. The rooms that have been occupied by phthisical patients must be thoroughly cleansed, and, when practicable, re-papered, painted, and whitewashed before they are lived in by others.

In New York careless spitting has been made penal. It is certainly desirable that information as to the manner in which this disease is propagated should be diffused widely amongst the public, and voluntary notifications encouraged (in Norway and in New York it is compulsory). The free examination of sputum should be provided for by the public authorities, as well as the means for the disinfection of infected houses and areas. It is exceedingly desirable that it should be practicable for tuberculous subjects amongst the poor to be removed to and treated in suitable sanatoria, and that asylums for incurable cases should be provided. It is impossible in the dwellings of the poor to provide adequate means for the prevention of the spread of the disease.

CHAPTER II.

THE REGIMINAL TREATMENT OF PHTHISIS, INCLUDING "SANATORIUM" TREATMENT.

Importance of Hygienic Treatment—Food—In relation to the Fever—Value of Fats and Carbohydrates—Care in the Preparation of Food—Milk and Cream—Koumiss—Raw Meat—"Zomotherapy"—Farinaceous Foods—Alcohol—*Alimentation Forcée*—Diet should be varied and attractive—Daily Dietary—Air and Ventilation—Value of Open-air Treatment in Sanatoria—Pneumatic Treatment—Effects of Inspiration of Compressed Air and Expiration into Rarefied Air—Bodily Exercise—Lung Ventilation—Hydrotherapy—Baths and Douches—Sponging—Clothing—Summary.

WE propose in this chapter to consider the regiminal or hygienic treatment of phthisis, the supreme importance of which is now fully recognised. A disease which is so profoundly influenced by the state of nutrition of the body must be encountered by the most scrupulous regard of all those daily and hourly conditions and habits of life which tend to support and strengthen the constitution, and impart to it a resisting power.

A very great part of the undoubted advantage which phthisical patients gain from residence in "sanatoria" must be attributed to the constant detailed and intelligent supervision they receive in these institutions.

"*Im Kleinen grosse*"—"Great in small things"—is the motto chosen by Dr. Dettweiler, of Falkenstein; which means that every detail of the daily life of the phthisical patient, with regard to food, drink, exercise, clothing, sleeping, etc., is regulated and fixed by medical authority.

First, as to the **food** of the phthisical patient.

In a disease like pulmonary consumption, attended with a chronic febrile condition, and consequent continuous loss of weight, unless this progressive wasting is counterbalanced by the supply and annexation of

an adequate amount of food, the patient must, in course of time, succumb to the disease. Tubercular patients with active disease require a much larger amount of food than persons in health, in order to compensate for the increased tissue waste. It is well known that if we are able to establish an improved state of nutrition, the disease itself becomes favourably influenced thereby. Our success in this effort will depend much on the amount and type of the febrile state which accompanies the malady. When there are distinct intermissions or remissions in the febrile movement, and when the fever is quite moderate, we may succeed in procuring the assimilation of a considerable quantity of food, provided great care and discretion be employed in its selection and preparation. But when the fever is considerable and persistent, and the digestive functions (as is usually the case in such circumstances) are greatly impaired and appetite is entirely absent, it may be difficult or even impossible to obtain the appropriation of a sufficient quantity of food to exercise any adequate check on the wasting process. In such cases we are compelled to have recourse wholly to fluid and easily absorbable foods in much the same manner as in the dietetic management of acute febrile diseases.

It is a generally accepted rule that in the diet of the consumptive, fats and carbohydrates—*i.e.* the especially fattening forms of food—should be at any rate adequately, if not superabundantly, represented.

One of the greatest difficulties we encounter in providing a suitable and adequate diet for consumptives is the frequency with which they complain of digestive troubles, want of appetite, and, occasionally, of positive disgust for food. In such circumstances it is most important to provide well-cooked, appetising, and attractively-served food, varied as much as possible, and, so far as is consistent with wholesomeness, agreeable to the tastes of the patient.

We are, however, assured that at the Nordrach sanatorium even *febrile* patients are induced, by Dr.

Walther's persuasive skill, to consume large quantities of solid food of the most substantial kind.* And Osler and Flick have pointed out that it is not difficult to induce the phthisical patient to take a large number of raw eggs daily—a very excellent and nourishing food.

Phthisical patients whose digestive functions are unimpaired may be allowed to partake of the various nourishing forms of food that enter into the ordinary dietary of the healthy, in addition to which two or three glasses of milk should be taken at convenient intervals between meals, and one of these glasses of milk should be taken the last thing at night, or even preferably during the night, if the patient is awake.

Cream † may also be made digestible and acceptable to many patients by mixing it with an equal quantity of hot water, and adding to each teacupful of the mixture half a teaspoonful of the aromatic spirits of ammonia; some prefer a teaspoonful of brandy. In other cases we may use *peptonised* milk.

Koumiss, or fermented mare's milk, has acquired a great reputation in Russia in the treatment of pulmonary tuberculosis, and the Russians resort in considerable numbers to those stations on the borders of the Caspian Sea, amongst the Kirghis and Tartar tribes, where the koumiss cure is carried on.

It is an appropriate beverage in febrile cases, as it quenches thirst, and can often be retained in the stomach when all other food is rejected; indeed, its special value is in those cases of inveterate dyspepsia and gastric irritability in which all attempts at giving other kinds of food have failed.

The use of *raw* meat was, a few years ago, highly extolled by Professor Fuster, of Montpellier, who claimed the most brilliant results from its administration in cases of phthisis. These results were not, however, confirmed by other observers.

* *See* a remarkable paper in the "Tuberculosis" number of the *Practitioner*, July, 1901, by Dr. Mander Smyth.

† We refer to fluid cream.

Recently its use, or that of "*muscle juice*," has been revived by Messrs. Richet et Héricourt, under the title of "*Zomo-therapy*,"* and strongly advocated in the treatment of tuberculosis. If the patient can take and digest raw meat *in large quantity* (300 to 400 grammes in the first stage, and 500 to 800 grammes in the second stage of phthisis) he need not be given muscle juice, the preparation of which is always a tedious and difficult process. But if he cannot take raw meat, then he must consume a large quantity of the juice of very fresh steak, expressed in the manner and with all the precautions detailed. In the third stage, or in the acute form, he must absorb daily the juice of as much as 2 to 3 kilos of raw beef. The rest of the dietary will be normal, but with the exclusion of eggs. All drug treatment must be stopped, but cod-liver oil may be continued. By this method M. Héricourt is reported to have obtained "striking," "rapid," and "unexpected" cures. Whether the muscle plasma acts as an anti-toxin, or stimulates phagocytosis, or is only a special tonic to the nervous system, the authors of this method have not yet decided. Still more recently, C. Fraenkel and G. Sobernheim† have carefully tested these results, and have come to the conclusion that a raw meat diet has no influence on the course of tuberculosis, and they cannot agree with Richet and Héricourt that the method is worthy of a trial on human subjects.

The different kinds of farinaceous foods are all useful and appropriate articles of diet. Whole meal or well-made brown bread is, on account of the phosphates contained in it, better suited to young consumptives, if they digest it well, than white bread. Lentil flour also is valuable, as it contains notable proportions of phosphates and of iron. Oatmeal is rich in fatty matters, and the flour of maize is still

* For a full account of this method refer to an article under this heading, by Dr. L. Robinson, in the *Practitioner* for July, 1901.

† *Berl. Klin. Woch.*, July 15th, 1901.

richer—a fact which renders them both very suitable additions to the diet of the tuberculous.

With regard to the use of *alcoholic beverages*, much difference of opinion exists.

We shall find, practically, that the use and need of alcohol vary greatly in different individuals. In some it diminishes appetite and retards digestion; in others it promotes both; and we shall encounter very few cases of phthisis which are not benefited, at some period of their course, by the discreet administration of alcoholic stimulants.

It is exceedingly necessary that the beverage, whether wine, spirits, or beer, should be pure and of the best quality.

When the patient is able to drink fermented *malt* liquors, he may be allowed two or three glasses daily of good, sound bitter beer, or porter, or stout; of wines, a half a pint to a pint of *really* good Bordeaux or Burgundy, or of some of the better descriptions of Hungarian, Italian, or Greek wines.

In febrile cases, small quantities of alcohol given frequently have an excellent effect in supporting the strength; and especially during the night is it important to give two or three tablespoonfuls of brandy or whisky, alone, or with a little fluid food, such as milk, or beef-tea, or a whipped egg.

What was termed by French physicians "*alimentation forcée*"—*i.e.* forced feeding—has, in the manner originally applied, fallen into disuse, but the principles involved are generally applied as a part of sanatorium treatment, and patients in such institutions are urged to consume a large amount of food as a necessary means to their restoration to health.

While we should do all in our power to encourage our phthisical patients to take an abundance of nourishing food (and for this purpose we should make their diet as varied and attractive as possible), we must be careful not to admit into their dietary forms of food which, although attractive to the patient, tend to exhaust his digestive forces without rendering

him an equivalent amount of support and nourishment. We should, therefore, exclude pastry, uncooked fruits, salads, pickles, and all forms of indigestible food.

It would be undesirable to fix too rigidly the daily dietary of the phthisical, but the following scheme may serve as a general guide—a sort of plan of route from which wide excursions may be made under the guidance of a discreet physician :—

On waking in the morning, a tumblerful of milk should be taken mixed with a little hot water, to which it is often useful to add a few grains of common salt and bicarbonate of soda, which greatly promote expectoration, especially when a certain amount of accumulated mucus has to be got rid of. There is no objection to taking a little tea, coffee, or cocoa at this hour, with milk or cream, if preferred. Sometimes in advanced cases the stimulus of a tablespoonful of brandy, rum, or whisky is needed at this time. This first meal is often best taken in bed. About an hour afterwards a substantial breakfast should be taken, consisting either of broiled bacon and lightly-boiled eggs, or some fresh fish, or some cold meat or game or poultry, and with this meal milk, or cocoa, or coffee, or tea, or some good sound light wine and water may be taken, according to taste.

Supposing this meal to be taken about nine or ten o'clock, a glass of milk or a cup of cocoa should be taken about noon.

Half-past one or two o'clock is a good hour for the chief meal of the day. This should consist of some fish, when it can be procured fresh and good, together with some meat, chicken, or game, and potatoes and fresh vegetables; and some light milk-pudding with a little marmalade or other cooked fruit. With this meal half a pint of good Hungarian wine, light claret, or Burgundy may be taken.

At five in the afternoon another glass of milk should be taken, or a cup of chocolate, or tea with plenty of milk or cream; or the yolk of an egg beaten

up with a little brandy and water may be substituted, if preferred. It is rarely desirable to order any solid food at this hour if it is intended that the patient should make another substantial meal at seven. At this hour a meal similar in all respects to that taken at 1.30 or two o'clock should conclude the substantial feeding of the day.

About half an hour before bed-time (which should not be later than 10 or 10.30 p.m.) another glass of milk, prepared in the same manner as that in the morning, together with one or two tablespoonfuls of brandy or whisky, or a cup of arrowroot, or beef-tea, or tapioca soup, according to taste, may be taken. And, finally, some provision of light nourishment mixed with a little stimulant should be provided to be taken during the night, when the patient is wakened by coughing, or after perspiration, or when merely restless.

In distinctly febrile cases a much more fluid dietary will have to be followed, and the food will require to be taken at shorter intervals. Dr. Mander Smyth describes a "typical dinner" at Nordrach, where he was in bed with a febrile exacerbation, as consisting of "a plate of pork and potatoes, a leg and wing of a chicken, salad and more potatoes, and, to finish, a large wedge of very solid pastry"! *

Air and ventilation.—It is exceedingly necessary to watch over the respiratory functions of the phthisical, and to see that they breathe a pure, untainted atmosphere. Wherever and whenever it is safe and possible to be altogether in the open air, there the sufferers from phthisis should be. Hence, the value and importance of treatment in sanatoria as these are, or should be, in situations where free exposure to the open air is possible without the risk of encountering injurious agencies. At Falkenstein, Göbersdorf, and other sanatoria for consumptive patients, hammocks are swung among the pine trees around, and, whenever the state of the weather will

* *Practitioner*, July, 1901.

permit, the patients are encouraged to be in the open air as constantly as possible. At Nordrach Dr. Mander Smyth, referring to his bed-room, says, "The windows of my room, constituting nearly the whole of one side of it, were open night and day, and a strong draught played through them, breathing of the pine-clad slopes."

The advantage of a southern aspect for the sleeping apartment of the phthisical, in a situation sheltered from prevailing winds, is chiefly that the windows can be always open, and the apartment thus constantly kept filled with pure and fresh air, which the rays of the sun warm and vivify.

It is to the possibility which it often affords of being much in the open air, even in winter, that *change of climate* owes its great value.

Even in England it has been shown that in properly selected localities, and in well-organised sanatoria, it has been possible for patients to be kept much in the open air all the year round.

In advanced cases, when the patient is, of necessity, much confined to his room, a comfortable reclining couch should be provided, so that even if very feeble or feverish he need not be confined too closely to his bed. The bed should be free from all hangings, and if the windows are kept open, as is desirable, the patient should be very warmly clothed or covered, so as not to feel cold. The temperature of the room should range between 60° and 65° F., according to the feelings and condition of the patient. In very cold weather, when the temperature of a room quickly falls, and is often with difficulty renewed, a temperature of 65° will not be found too great for advanced cases. An open fire-place is the most cheerful source of heat, and it also promotes ventilation.

The importance of rest in bed during the febrile periods, or the inter-current inflammatory attacks which not unfrequently occur in the course of phthisis, must not be overlooked ; and however important and suitable to the majority of cases open-air treatment

may be, we must by no means disregard the need of shelter from cold for certain highly sensitive and catarrhal cases; indeed, discretion and discrimination in this respect are as important as in the question of food.

The advantage of sanatorium * treatment is not limited to the opportunity it affords of hyperaëration of the lungs by being almost always in the open air; but, as has already been pointed out, depends also on the constant detailed supervision of the patient's life, in every minute particular, which is ensured.

When it is practicable, a combination of climatic and sanatorium treatment is preferable to sanatorium treatment without climatic advantages. But recent experience has shown that very good results can be obtained in well-planned sanatoria in carefully selected localities in England and Germany, whose climate, taken alone, could not be regarded as especially favourable to phthisical patients.

In the construction and arrangement of such institutions it is of chief importance to seek protection from prevailing winds, a dry, absorbent soil, a southern exposure, and the avoidance of localities liable to much damp and fog. There should also be an agreeable environment for taking exercise suited to the capacities of different patients. Drawbacks to this mode of treatment are the length of time needed to effect a cure and the evils attendant on prolonged mental and physical inaction.

This will be a convenient place to consider the utility and value of the **pneumatic treatment** in phthisis—a mode of treatment which has for its object the complete aëration and ventilation of the lungs, the promotion of the pulmonary circulation, and the removal of inflammatory exudations and infiltrations, by establishing a sort of lung gymnastic, either by the employment of portable apparatus, or by residence in the pneumatic chamber, or "compressed air-bath." This method is no doubt valuable as a

* A list of Sanatoria will be found in vol. ii., p. 98.

means of prophylaxis, but many Continental physicians maintain that it is efficacious also in the treatment of certain forms of chronic phthisis.

Jaccoud asserts that it should be applied, either by the portable apparatus or in the pneumatic chamber, during the whole period of the "initial apyretic phase" of phthisis. He prefers the apparatus* which allows of the inspiration of compressed air, and expiration into rarefied air. He maintains that its "minimum effect" is to retard considerably the extension of the disease, and this effect he believes to be constant; in a certain number of cases, in from six weeks to three months, he has observed a distinct diminution in the extent of the pre-existing changes, so that they have receded to only one-half their former extent; and in a few exceptional cases, falling under the category of apex catarrhs, he has observed an entire disappearance of all physical signs of disease.

Inspiration of compressed air leads to a more complete expansion and a more perfect ventilation of the lungs; it increases the intrathoracic respiratory pressure, and quickens the pulmonary circulation. The frequency of respiration and of the pulse is lowered, while the force of the latter is increased; an increased quantity of oxygen is absorbed into the blood, and an increased quantity of carbonic acid is expired; these conditions are favourable to the maintenance of nutritive activity, and unfavourable to the development of microbes.

Expiration into rarefied air leads to more perfect expiratory contraction, and consequently to a diminution in the residual air, and, therefore, to more complete pulmonary ventilation. Both processes tend to more perfect expansion and ventilation of the lungs, and more perfect aëration of the blood.

Judiciously-arranged gymnastic exercises, walking

* For a full description of all the apparatus used in pneumatic treatment, *see* the author's translation of Oertel's "Respiratory Therapeutics" (Smith and Elder).

up gentle inclines, residence in elevated districts, serve the same purpose, and may lead to the same results.

Bodily exercise is of all things most essential in the treatment of chronic and afebrile forms of phthisis, as without it nutrition languishes and the bodily strength steadily diminishes.

Sydenham maintained that daily and continuous horse exercise was the best treatment for consumption.*

Regular walking and riding exercise (always stopping short of fatigue), and slow, regulated climbing, bringing into play a certain amount of lung gymnastic, are most useful in promoting nutrition, limiting the spread of local disease, and favouring retrogressive and curative processes, by promoting complete expansion of the sound portions of lung, and thorough pulmonary ventilation, and more perfect oxygenation of the blood. Consumptive patients should be taught in their out-door exercise to practise, from time to time, taking the deepest possible inspiration, followed by the completest possible expiration, and by this lung ventilation carried out with gentleness, and without any undue effort, they should be given to understand that they make the best possible use of their opportunities of breathing pure, healing air.

When walking or riding is too fatiguing, carriage exercise, or exercise in a bath-chair, or in a rowing- or sailing-boat, on sea or river, is admissible in fine weather, provided undue exposure to cold currents of air is always guarded against. Of course, these remarks apply only to *afebrile* cases.

We have spoken in the chapter on prophylaxis of the great importance of a *bracing, tonic treatment of the skin*, which is abnormally sensitive and impressionable in phthisical subjects; a treatment that is intended to diminish the tendency to chills, which often react unfavourably on the lung condition. With this object in view some physicians who have had the

* *See* paper by the author on "The Treatment of Consumption by Climate," *Brit. Med. Journal*, July 27th, 1901.

special care of patients with phthisis have been led to employ and advocate a modified **hydrotherapeutic course** in the management of the more chronic forms, and this is included in the healing resources of many sanatoria.

It is scarcely necessary to say that the application of the cold douche in such cases requires the greatest caution and circumspection. Sokolowski studied the effect of the cold-water treatment on 105 patients with phthisis, at Göbersdorf, and he reported that out of these there were thirty-nine complete cures, thirty-four greatly benefited, nineteen slightly benefited, seven derived no benefit, two were made worse, and four died. He points out the necessity of great prudence in its application, and that it is only suited to those cases in which the local lesions are not extensive; that it is counter-indicated in cases of profound anæmia, in hectic fever, and in all cases which are not at once benefited by the first few douches. The douches should be of very short duration, commencing with four to five seconds, and increasing to thirty seconds with females, and fifty seconds with males. At Davos the application of cold douches of short duration to the chest has entered largely into the practice of some of the physicians.

No doubt these cold douches of short duration have an excellent general invigorating effect on those who can support them, and who react vigorously to them, especially when they are commenced during the hot season; and they undoubtedly tend to strengthen the skin, and to remove that tendency to take cold from the slightest exposure which is so troublesome in the phthisical. But those, even, who are quite unable to support the cold douche may derive much benefit from cold or tepid general sponging of the skin in their own apartments, and it is often an advantage to add a little alcohol, or eau-de-cologne, or toilet vinegar, to the water used. Only a portion of the body should be uncovered and sponged at a time. But often the whole body may with advantage,

once a day, be rapidly sponged over with cold water, provided this is done in a *warm* room. If, for the sake of ventilation and freshness, the patient's bed-room is not kept very warm, he should pass into a *quite warm* dressing-room before the cold sponging is applied. It is the combined contact of *cold air* and cold water that causes the latter to be ill-borne.

After the application of cold or tepid sponging the surface of the body should be well rubbed with a warm, dry towel.

The **clothing** of phthisical patients should be light, but warm; light woollen material is the best. As they are usually very sensitive to cold currents of air and to changes of temperature, they should always have an extra wrap or warm covering at hand to put on when feeling the least chilly. It is a mistake to wrap up their chests, as so many do, with layer after layer of flannel, cotton-wool, rabbit skins, "chest protectors," porous plasters, etc. When such a patient removes all these coverings you will often find the surface of the body wet with confined perspiration, in which the skin is, as it were, soaked, and rendered thereby much more sensitive.

All the clothing should be changed at night, and a thin flannel or cotton nightgown put on; too much clothes must not be heaped on the bed, especially when there is a tendency to night-sweats; and when the bed-chamber is kept at a suitable and equable temperature a great quantity of bed coverings is not needed, but when the patient's bed-room is freely exposed to the open air, winter and summer, it is highly important that he should have an abundance of warm coverings that he may not feel cold.

END OF VOLUME I.

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